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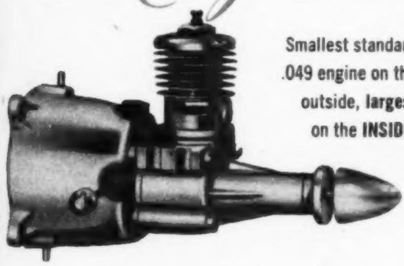

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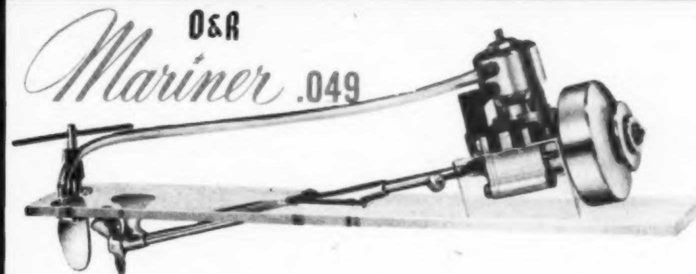

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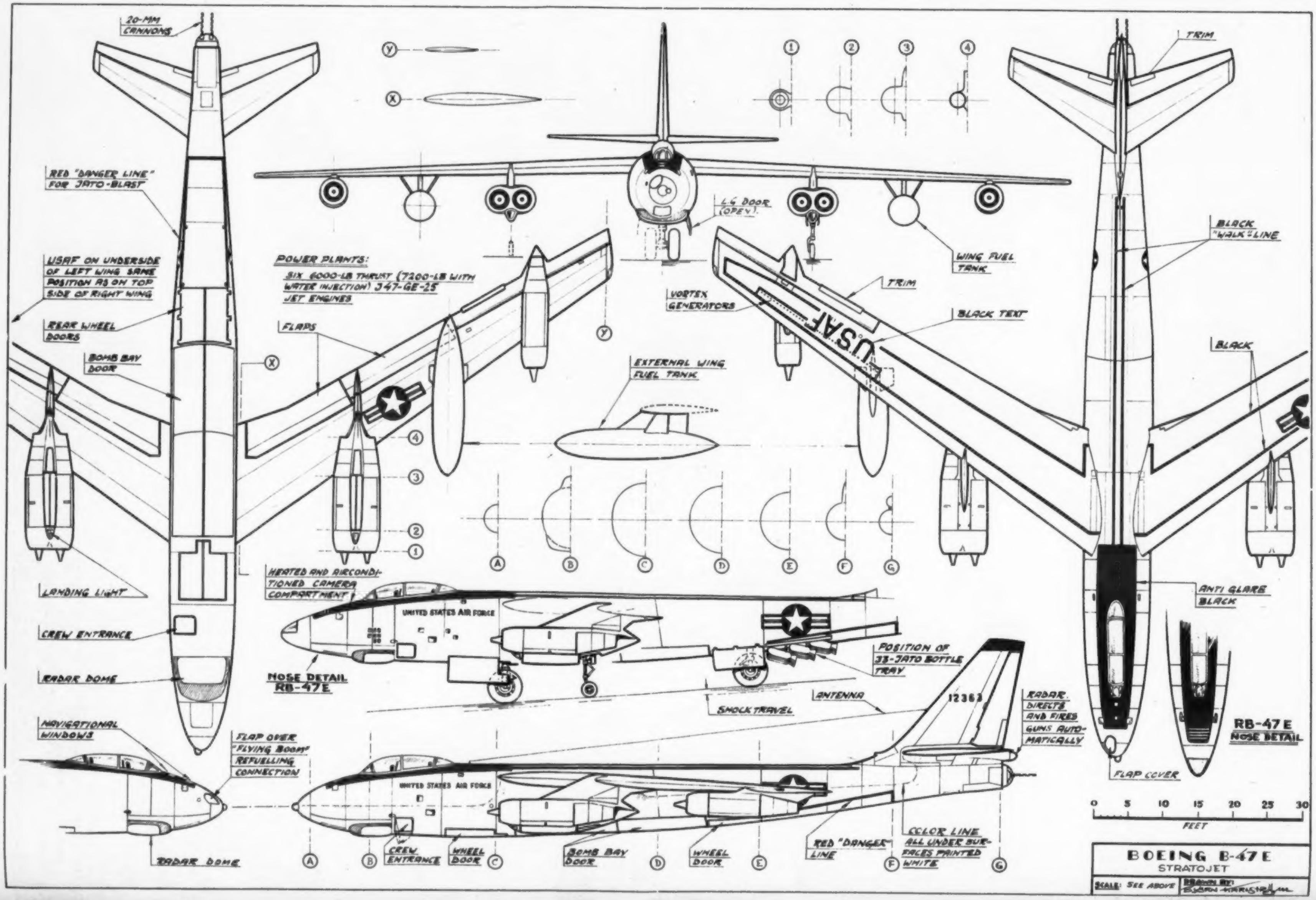

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MODEL AIRPLANE NEWS

JAY P. CLEVELAND, President and Publisher

JUNE 1956 Vol. LIV—No. 6

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WITTICH HOLLOWAY, Art Director

Contributing Editors: Peter Chinn (England), Don Grout, Ed Lorenz, Ted Martin, Bruce Wennerstrom, Harry Williamson

Executive and Editorial Office:
551 Fifth Avenue, New York 17, N. Y.

Advertising Manager, N. E. Slane, 551 5th Ave., New York 17; West Coast Adv. Mgr., Justin Hannon, 4710 Crenshaw Blvd., Los Angeles 43, Calif.

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by William Winter

► Out to Grand Rapids, Mich., again for the annual Trade Show and convention of the Model Industry Assn., February 22 through 26. To sum up: things have changed. With only some 10 per cent of the total membership of well over 700 being in the Aeronautical Section, the Association changed its name to Hobby Industry Assn. The other 90 per cent includes such things as backyard kiddie locomotives, stamps, electronics, steam engines, basket weaving, painting, even art supplies. The place looks more like the New York Toy Fair every year.

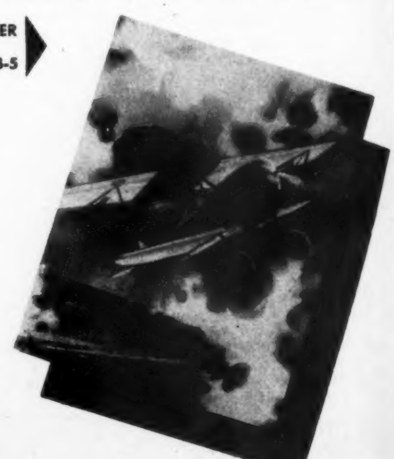
So many exhibitors (much of it is big business—Revell, for example) that a reporter is like the blind man describing the elephant. Revell will break $7-million volume this year. And there are others in the plastics line: Lindberg (with scale turbojets inside the jet planes), Hawk, Monogram, Aurora, Comet, to mention a few, with everyone climbing on the band wagon because hundreds of thousands of dollars worth of wood working machinery is gathering dust in a number of plants. The plastic model manufacturers must be doing upward of $10-million annually which, at retail level, would be more than doubled. Scale trains comprised a surprisingly big portion of the Show. So many displays that one suspects that, like plastics and the four garages on one corner, competition must be more than keen.

Thick trade magazines devote whole issues to the Show. Not able to write upon the head of a pin, we'll have to content ourselves with a few impressions and one question. What will the Hobby Industry Assn. be like five years from now?

The keynote of the Show might have been a striving for perfection. Not only were many items clever and attractive, but quality seemed stepped up. This is not something the exhibitors may have been aware of, living with the stuff as they do, but it would be difficult to find fault with the aeronautical end of it, from engines to planes—let's even say boats, for the sake of the people who make both.

Why was it that we were so aware this time of the gallant individual striving to perfect some item? Why Duke Fox with that special racing .29 engine with its radically advanced features, or Darwin with his well-thought-out wood-cutting and shaping techniques and, on the stunt-combat trainer, a paper-covered wing? (*Continued on page* 6)

NEXT MONTH'S COVER
Boeing FB-5



PLANE ON THE COVER

Widely used as civil executive transport and by Army as the L-26, the Aero Commander is made by Aero Design & Engineering. Lycoming engines of 260 hp each. Wingspan is 44 ft. 7 in. Cruises about 200 mph. When President Eisenhower goes to his Gettysburg, Pa., farm, he frequently flies in the Aero Commander.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MAN at Work

(*Continued from page 4*)

Darwin himself has covered as many as 80 wings in a day! Or Dick Dinkle, whose Scalemaster kits have come so far in just a year? Why does Johnny Brodbeck, who, with Al Gasdia, operates K&B Allyn, get up in the night to machine an .09 with a .15 shaft, using a .15 porting machine, to come up with one of the wildest .09's you ever did see? Or Bill Atwood—manufacturer, yes, but modeler always—with that Wasp-like .15—besides the Shriek, and other things, of course? A chap you never heard of, Bob Smurthwaite of the J. Roberts Model Mfg. Co., all but unnoticed at the Show, but yet with one of the most promising things in U-control since Walker started the whole shooting match. He has a multiple control bellcrank and a handle which seem to represent a big step forward. And some nice ukie stunt kits. Where has he been—how long cooking this up? Carl Goldberg, on his own, with two beauts of free flight kits—his first love—and the usual small stuff.

Then there is the perfectionist working for others—Like Lou Andrews of Guillow with, for example, tricky new removable noses, with engine and gear, for profile controlliners. Or the perfectionist teams, like Babcock, and that amazing 465 on tone, two-channel simultaneous, transistorized receiver with no tubes, and you can fly two at once. Or perfectionists wise in the way of machinery and mass production like the Charlie Brebecks or Harry Rice. But we are not here to name names or give plugs. For each we've mentioned. there are a dozen others. And the usual assortment of stories and fleeting impressions, like the Disneyland alligator that almost swallowed Babcock's RC boat.

• • •

► The name of J. Van Hattum, The Hague, Holland, has long been one of the most respected in world modeling circles. The great Dutch modeler is one of the true "wise elders" of the hobby. Last December, Van Hattum circulated a letter among name builders of many lands. His concern was the FAI rules which will take effect on January 1, 1957. In asking for replies to specific questions, he stated the issues so well that it would be a service to quote him here.

To set the stage, the FAI, worried over the large number of ties resulting from the many five-maximums under the three-minute rule (FAI created that problem trying to get away from the older problem of vast distances covered under the five-minute rule—that's from MAN at Work, whom you'd best ignore!), dramatically upped the power loading from 200 to 400 grammes per cubic centimeter of engine displacement and, for Wakefield, got the same effect—they hoped—by dropping the allowable weight of the rubber motor from 80 to 50 grammes. If these new rules are wrong—and Van Hattum does not say they are, but he asks—the weight of international opinion would then be an effective argument of review of the rules.

"It is not the intention to create opposition to the FAI, except on this ruling," states Van Hattum. "Much of the work of FAI is of considerable value and the Federation as a whole should not be blamed for decisions taken by its committees. Moreover, these have been charged with the task to set up rules and votes are taken fairly on a strict majority. It is only when decisions are taken which appear to be remote from the needs and wishes of practical aeromodelers that they not only have a right to protect, but a duty to do so.

"It will be clear that the decisions taken were the result of the wish to reduce the chances of the fly-off which, as we all agree, is not a satisfactory end to an important contest," Van Hattum continues. "By reducing the performance of the models, it is thought to solve this problem. Many do not agree that this is the answer. Two important International Classes of model aircraft are to be uprooted and design development changed. Once this direction has been taken, a dangerous precedent has been created. In the opinion of many, the contest rules should keep pace with the development; the model should not be penalized as performance rises."

MAN at Work came by this interesting letter via Bob Hatschek who had it from Cliff Montplaisir.

• • •

► One of the big troubles with eternally speaking your mind in print is that someone is always citing chapter and verse. Old friend John Worth, the Hampton, Va., RC'er and Internationalist fan, just played back a couple of neat paragraphs from the December, 1953 issue. Just when we figured John was reaching the crescendo (two fists simultaneously on the ivories), he asked coyly, "And who said this?" The point had been made at the time that prestige was lacking in modeling, that name trophies no longer held meaning and inspiration. That worth while goals are too few today. John then wants to show how come we now figure the American Internationalist set is putting promotion ahead of majority needs. Saying this isn't so, he wonders if editorials in that certain club paper led us to this assumption. Sure did, John. Several letters from clubs in that area asking us to notify everyone that they had no connection with said paper, made this eloquently clear. John's point is that we can't bridge the gap between the novice, young modeler and the International competition by seeming to knock down the International organization developed here in the last few years. What about this gap between kid and International competition that is unfortunately limited to a few hundred people out of a couple of million?

"It takes a lot of civic backing to put across these youth programs," states John, commenting on various suggestions in this column to encourage the kids. "It's amazing the support we *don't* get from business and civic-minded people. The record of . . . Clubs is typical. They pay lip service to supporting the model programs, but fall down on the job. When it comes to getting the members out to help, they find excuses to be elsewhere. They do seem to do okay in raising funds but without personal support at meets and model affairs, the whole deal falls flat.

"Our modeling group has worked with the CAP, Air Scouts, Exchange Clubs, Boys' Clubs, etc. To a uniform degree these groups have the idea that a model program consists of holding instruction classes. They dismiss the idea of competitive flying or any outdoor activity to go along with the classes.

"It looks as if this really is a parents' problem. The old father and son teams are about extinct. Pop wants his kid in the Boy Scouts but doesn't want any part of it himself. Kids want to go into the Cub Scouts but no one wants to be a Den Mother. We're living in different days than those when we 'old timers' were starting out.

"So here is one Internationalist who has had it when it comes to promotion. Be-

(*Continued on page 35*)


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Travel Air 2000

By FRANK W. BEATTY

From the open-cockpit goggle days of the 'twenties comes this authentic flying scale model for controlline fans.

Shock struts, exhaust pipes, scale wheels (these by Scalemaster), add realism. Similarity to the German D-7 made Travel Air movie stand-in.

The music from those flying wires in the breeze could tell you a lot—slipping, for example. Doug Rolfe (cutaway, p. 10) flew one of these.

The designer made one serious slip—those trees are out of scale! The model weighs about 26 ounces for a span of 34½ inches. That is good!

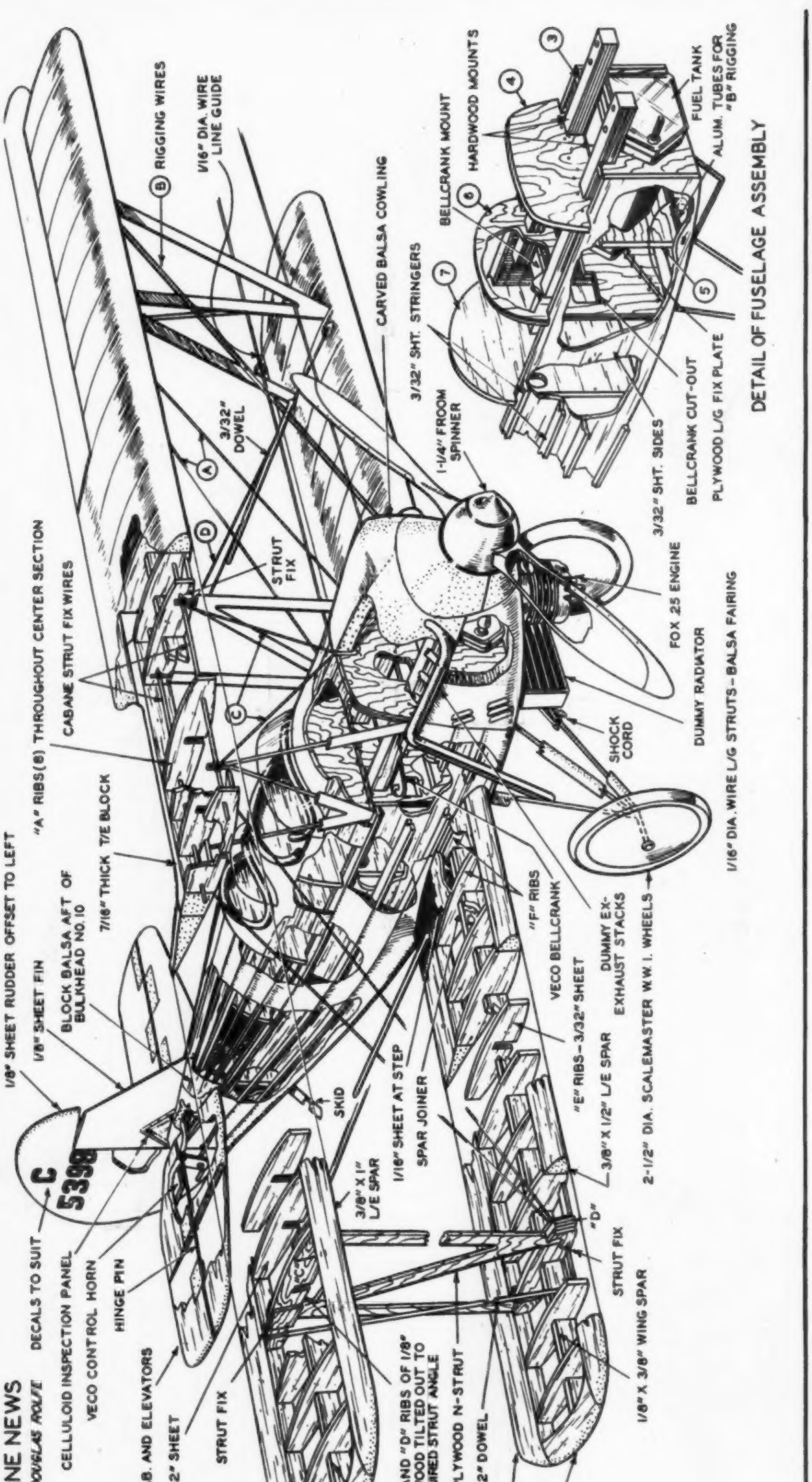
► The scale model fan has always shown a special fondness for the open cockpit biplane types. These grand old ships earned this admiration with their dogfighting, barnstorming and stunt exhibitions during aviation's "fly by the seat of your pants" era.

One of the handsomest and best proportioned examples of this type, from the modeler's viewpoint, was the Travel Air 2000. Once Joseph Nieto's fine Travel Air drawings were published (MAN, 2/53), this ship must then inevitably reappear on these pages in model form.

The model featured has a 34½ in. wingspan, is powered by a Fox .25 and weighs about 26 oz. Although not so heavy that she won't fly well, stunting in this ship is somewhat limited. The ship has the finish and detail of a contest performer, yet is constructed ruggedly enough for week-end flying. Now that you have fallen for this little charmer, let's talk about building one for you. This ship is not uncommonly difficult to build; however, it is advisable that close attention be given to the order of construction.

Let's start with the top wing first. Pin down the ⅛ x ⅜ in. spar; then assemble and cement to it the center section ribs A, the ⅜ x ½ in. LE and the 7/16 in. block at the TE. When this is dry, the 1/16 in. dia. cabane strut attachment wires may be pushed through ribs A and cemented well. The remaining ribs, TE and tips can then be assembled.

Parts for the lower wing should be assembled and cemented. When these are dry, the two panels may be cemented to the ⅛ in. plywood joiner. The wing roots should be sheet-covered on the top side only at this time. Re-



That Fox .25 is really neatly fitted in. Pipe the other details—real barnstorming era stuff.

member, if the plywood strut locator ribs C and D are carefully located, the wings will line up automatically on final assembly.

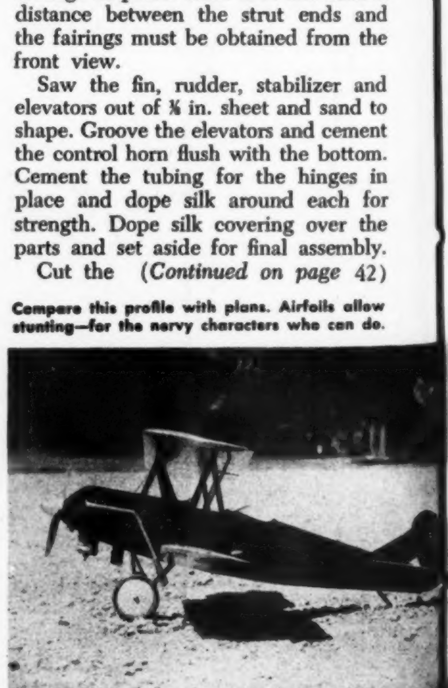
The 1/16 in. plywood strut socket covers and the 1/16 in. plywood rigging and aileron strut locators should be installed. Set all the rigging locators flush with bottom of the upper wing ribs. The rigging and strut locators are set flush with the top of the lower wing ribs for those which must be cemented against the sheet covering at the wing roots.

Cover the bottom side of the top wing and the top side of the lower wing with silk, give two coats of clear dope and cement the balsa rigging fairings in place. Note that the correct distance between the strut ends and the fairings must be obtained from the front view.

Saw the fin, rudder, stabilizer and elevators out of ⅛ in. sheet and sand to shape. Groove the elevators and cement the control horn flush with the bottom. Cement the tubing for the hinges in place and dope silk around each for strength. Dope silk covering over the parts and set aside for final assembly.

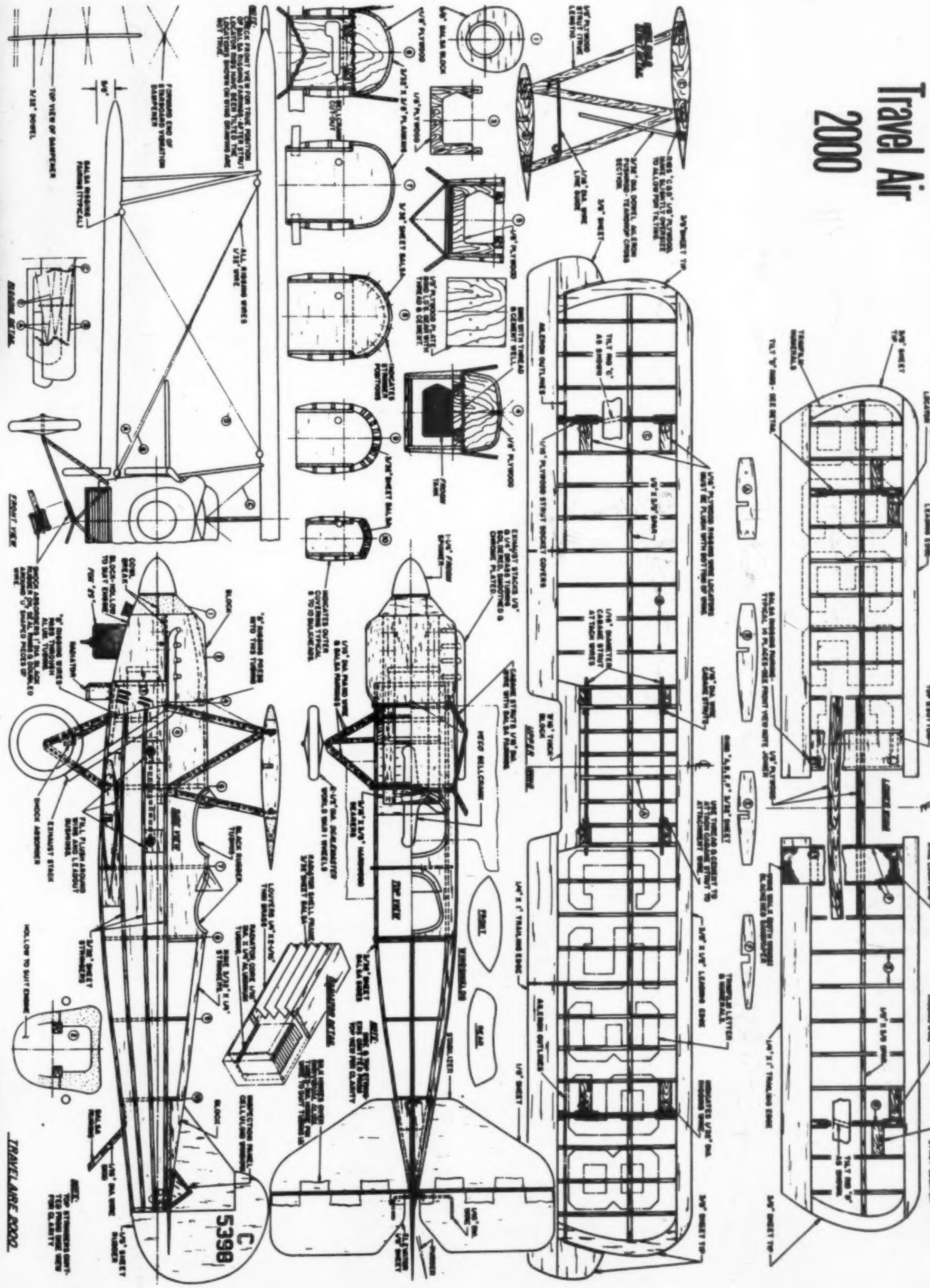
Cut the (*Continued on page* 42)

Compare this profile with plans. Airfoils allow stunting—for the nervy characters who can do.



Travel Air 2000

FULL SIZE PLANS AVAILABLE. SEE PAGE 48.



DRAGON LAIR

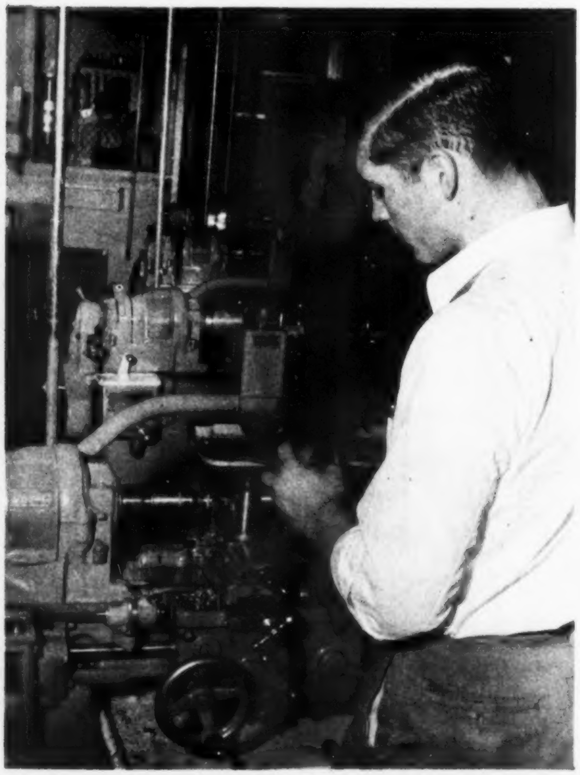
By JOHN R. WALKER

Students of the Senior Machine Shop Program, Bel Air High School, Md., adapted for their project production MAN's Lil Dragon.

► One of the many means the Industrial Education Dept. of the Bel Air High School, Bel Air, Md., utilizes to keep its Senior Machine Shop Program up to date and interesting is to schedule a project in mass production. Each year the projects decided upon have become more and more complex!

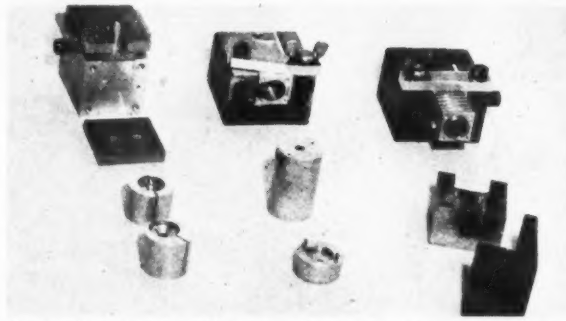
Inasmuch as the majority of Seniors in the '54-'55 school year were modelers, the natural project was a miniature internal combustion engine. Many plans and engines were examined and discussed until the Dragon (MAN, 10-11/50) was decided upon. The engine was modified to utilize more completely the equipment available in the shop.

The project was selected by the students who were also responsible for the design and manufacture of the jigs, dies, fitxures, etc. and the methods of production.

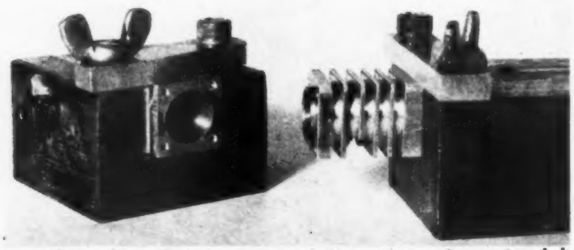


Part of the production line. Foreground shows the machining of the crankcase front. Other lathes working cylinder liner, shaft, case.

Not marching squares but a crop of nearly done Lil Dragons. Original article, by Roy Clough, appeared in October-November, 1950 MAN.

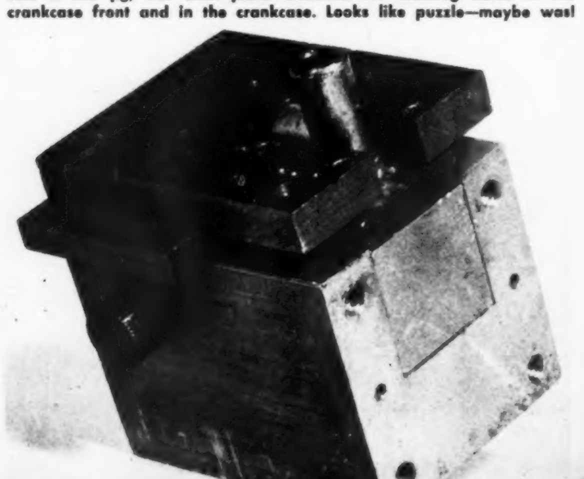


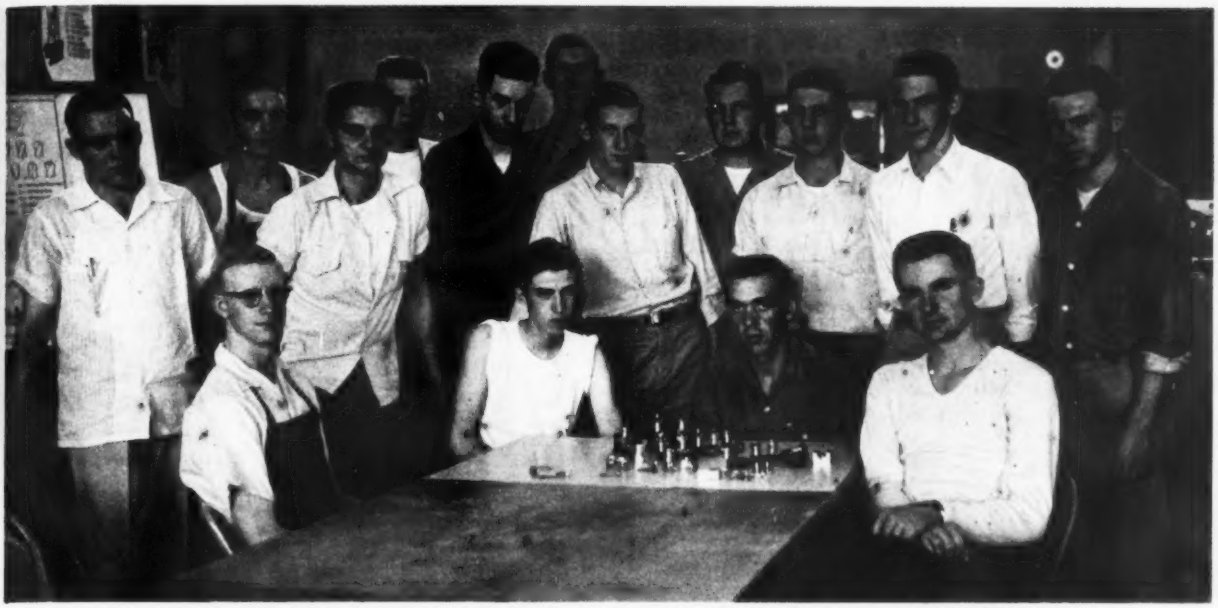
All the jigs, fixtures and dies used on the project were designed, built, by the students themselves. Engines run, but for fun, sport.



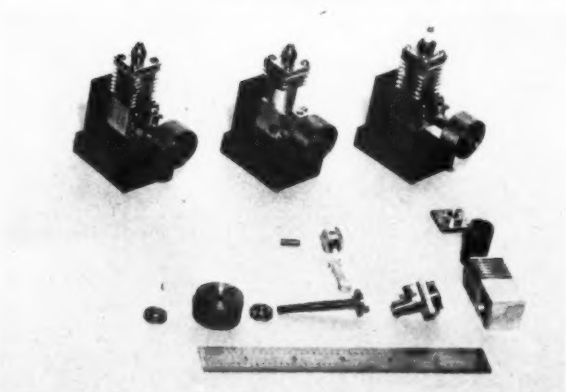
This photo shows fixtures used to hold crankcase for boring hole to receive cylinder sleeve. One on right holds the piece for finning.

This is the jig, but with plate attached for locating holes in the crankcase front and in the crankcase. Looks like puzzle—maybe was!

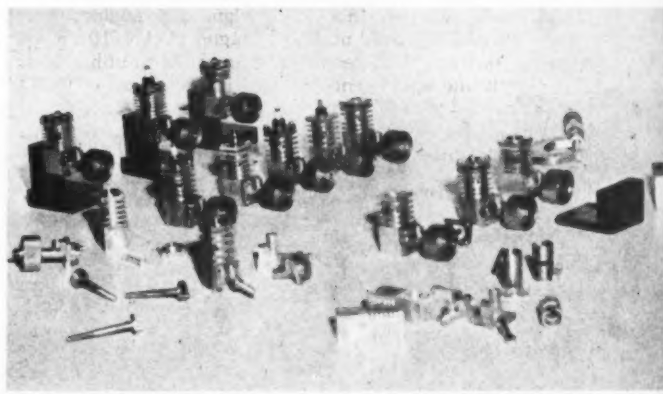




These are the young men who participated in last year's project. Was a most rewarding activity.

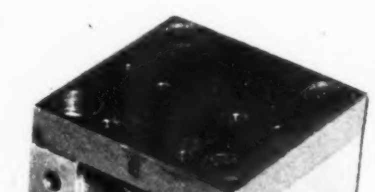


The first four engines off the line. Scale in foreground affords an interesting size comparison. Center engine has fewer cooling fins.

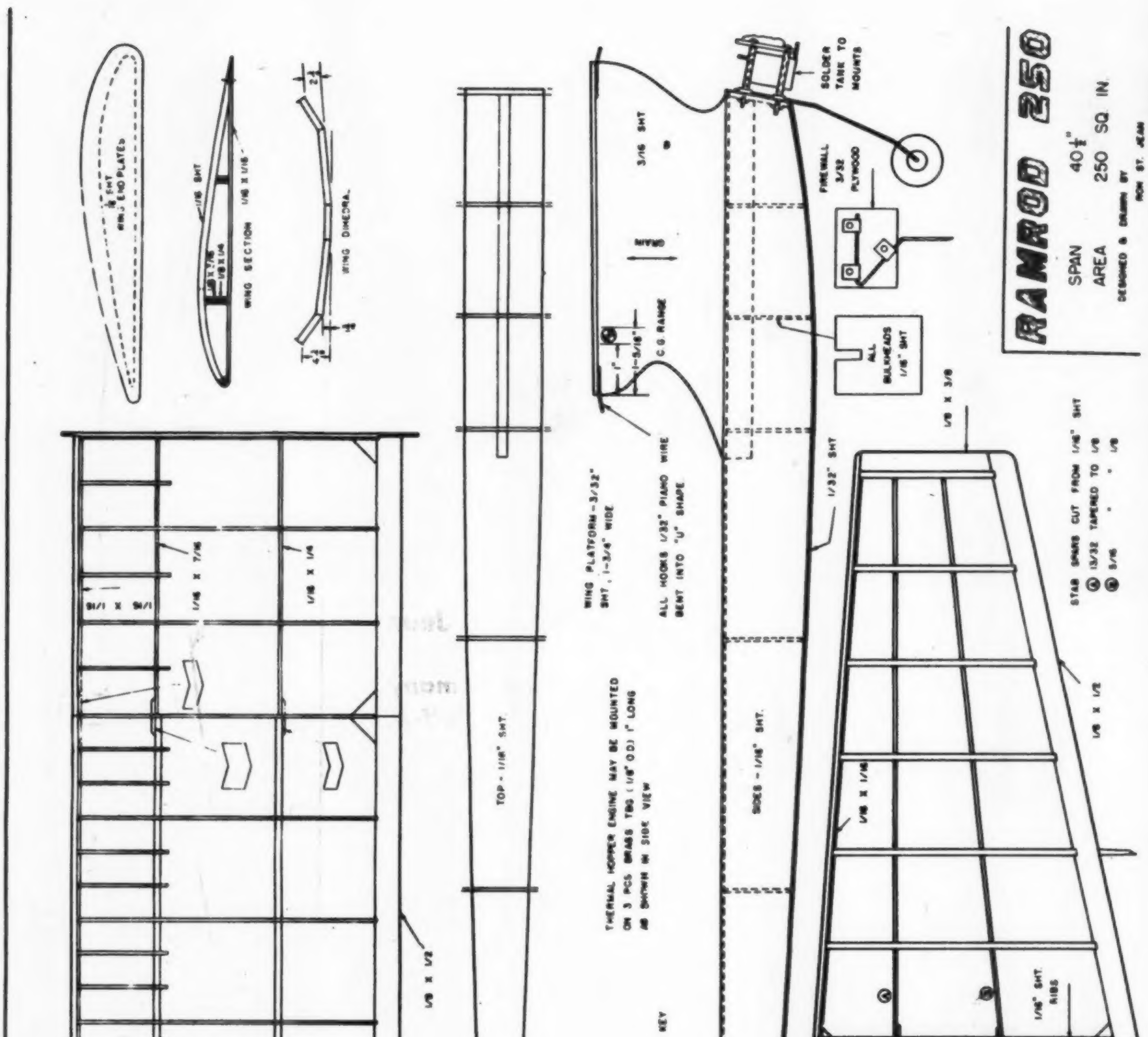


And here's a flock of—or do Dragons come in herds?—Dragons, in all stages of completion. Squared off design makes engine easy to machine.

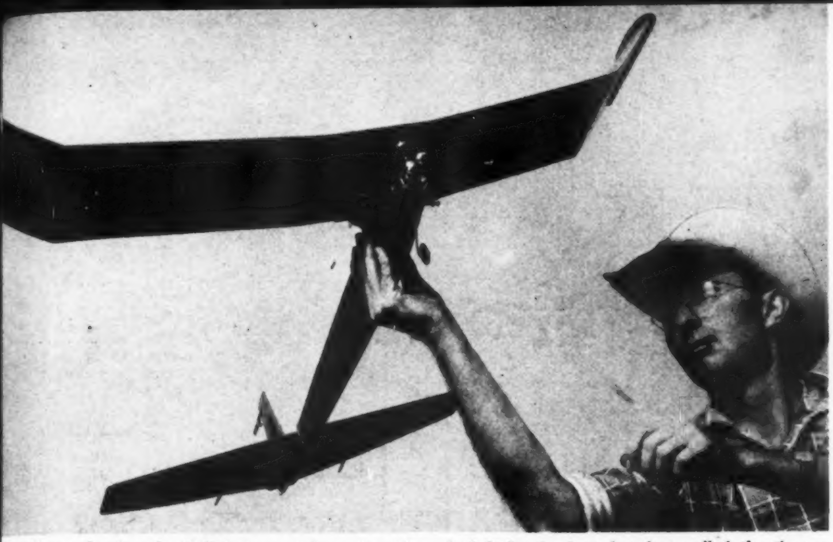
Planning the redesign of crankcase front. In minature this parallels plant experience where engineers, shop people have viewpoints.



This is jig used to locate the holes to hold the head to the crankcase. Project ideally illustrates jigs, fixtures.



FULL SIZE PLANS AVAILABLE. SEE PAGE 48.



Here releasing the Half-A Ramrod for a hand-launched flight, St. Jean has just pulled the timer.

RAMROD 250 . . . By Ron St. Jean

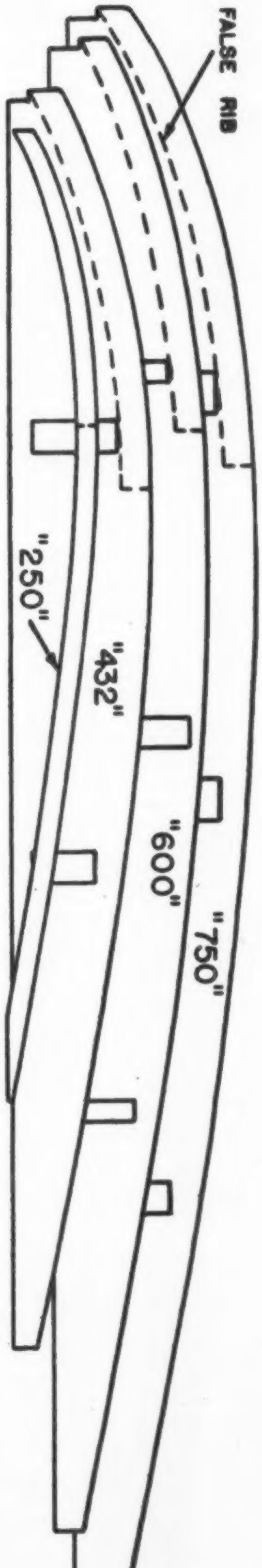
Biggest winner of the 1955 season, in all sizes and in many hands, was this California design. Plans show the Half-A.

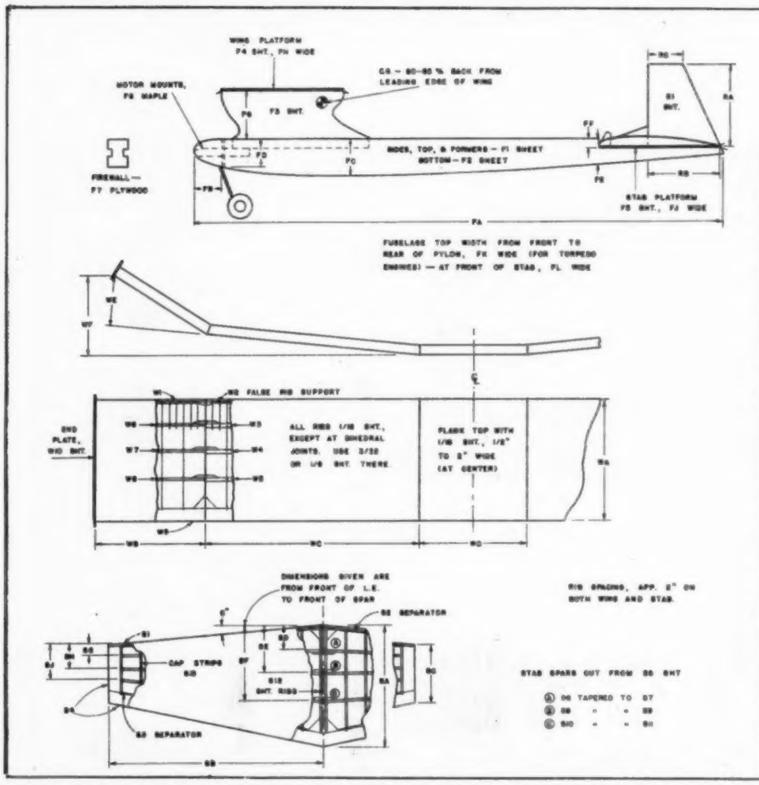
► Ramrod was seven years in the making, but has just recently established itself as one of the most consistent winners in California and at the 1955 Nationals. Let it win for you in 1956.

The ship is easy to construct and even easier to adjust, most of them checking out in three flights! Performance is excellent— *honest* dead air time is four to five minutes, depending upon size of model, weight and engine. Some 7 a.m. flights of seven minutes-plus on what I like to call "dew thermals" are not uncommon. The phenomenon mentioned is caused by the re-absorption into the air of dew lying in grass or hay after the morning temperature rises above the dew point. This results in a slight buoyancy, making many a modeler believe his four-minute gassie is a six-minute bomb. (Believe it or not, there are sometimes thermals at night—I know; a "750" with lights flew away at 10 p.m. one evening and it has not been heard from since!)

Like other successful gas models—

What the man with the stop watch sees a couple of seconds before the release. Tripod is for VTO.





RAMROD

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"600" — ".19" TO ".23" ENGINES, CLASS A OR B
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DIMENSIONS (INCHES)				WOOD SIZES (S = SHEET)			
MODEL	"432"	"600"	"750"	MODEL	"432"	"600"	"750"
FA	36	43	48	F1	3/32 S	1/8 S	H'D 1/8 S
FB	2	2-1/2	2-5/8	F2	1/16 S	1/16 S	3/32 S
FC	2-1/4	2-5/8	3	F3	1/4 S	H'D 1/4 S	3/8 S
FD	1-5/8	1-7/8	2-1/8	F4	1/8 S	3/16 S	3/16 S
FE	1-3/8	1-5/8	2	F5	1/8 S	1/8 S	1/8 S
FF	3/8	1/2	1/2	F6	3/8 X 1/2	3/8 X 1/2	3/8 X 5/8
FG	3-3/8	4	4-3/8	F7	1/8 S	1/8 S	3/16 S
FH	2-1/4	2-1/2	3				
FJ	1-3/4	1-7/8	2-1/4	R1	3/32 S	1/8 S	1/8 S
FK	1-11/16	1-7/8	2				
FL	15/16	1-3/16	1-1/4	W1	3/16 X 5/16	3/16 X 3/8	1/4 X 3/8
				W2	1/16 X 1/8	1/16 X 3/16	1/16 X 3/16
RA	5-7/8	6-7/8	7-11/16	W3	3/16 X 1/2	1/8 X 5/8	1/4 X 3/4
RB	5-1/8	6	6-3/4	W4	3/16 X 3/8	3/16 X 3/4	1/4 X 3/4
RC	2-3/8	2-3/4	3-1/8	W5	—	1/8 X 3/8	3/16 X 3/8
				W6	3/32 X 1/2	3/32 X 5/8	1/8 X 3/4
WA	8-1/2	10	11-1/4	W7	3/32 X 3/8	3/32 X 3/4	1/8 X 3/4
WB	7	8-1/2	10	W8	—	3/32 X 3/8	1/8 X 3/8
WC	16	18	20	W9	3/16 X 3/4	3/16 X 3/4	1/4 X 1
WD	7-1/2	10	10	W10	3/32 S	1/8 S	1/8 S
WE	3-5/8	4-1/4	4-3/4				
WF	5-7/8	6-7/8	7-5/8	S1	3/16 X 1/4	3/16 X 1/4	3/16 X 1/4
				S2	1/16 X 1/8	1/16 X 1/8	1/16 X 1/8
SA	8-1/2	10	11-1/4	S3	1/16 X 1/16	1/16 X 1/16	1/16 X 1/8
SB	15-1/4	18	20	S4	3/16 X 3/4	3/16 X 3/4	1/4 X 1
SC	4-1/8	4-7/8	5-3/8	S5	3/32 S	1/8 S	1/8 S
SD	1-21/32	2	2-1/4	S6	1/2	19/32	11/16
SE	3-1/2	4-3/16	4-5/16	S7	7/32	1/4	9/32
SF	5-15/32	6-9/16	7	S8	17/32	21/32	25/32
SG	27/32	1	1-3/32	S9	7/32	1/4	5/16
SH	1-21/32	2	2	S10	3/8	15/32	19/32
SJ	2-9/16	3-1/16	3-1/8	S11	5/32	3/16	9/32
				S12	3/32 S	1/8 S	1/8 S
				S13	1/16 X 1/8	1/16 X 1/8	1/16 X 3/16

Using this drawing, which is keyed to the table at the right, other classes of Ramrods can be made. Note wood sizes for three classes of ships.

Civy Boy, for example—Ramrod is the culmination of many years of trial and error designing. It all started in 1948 after the Olathe Nationals. Three other designs seemed outstanding in my mind and my purpose was to produce a model better than any of the three by combining what I considered the best points of each.

The first model, called Cowboy, had general proportions very similar to the 1948 Civy Boy, with simplified sheet balsa fuselage construction as in the Zeek, and thin airfoils, as in the 1948 Hogan. The first Half-A and A Cowboys were very successful, both winning first places in large local meets. Later "improvements," however, evolved models just full of bugs. On the basis of the first wins registered (1950), several plans were asked for and provided. Interest in Cowboy petered out, though, because it simply was not good enough to perpetuate itself. Ramrod, I'm certain, can sustain itself and grow, because it is a bugless design.

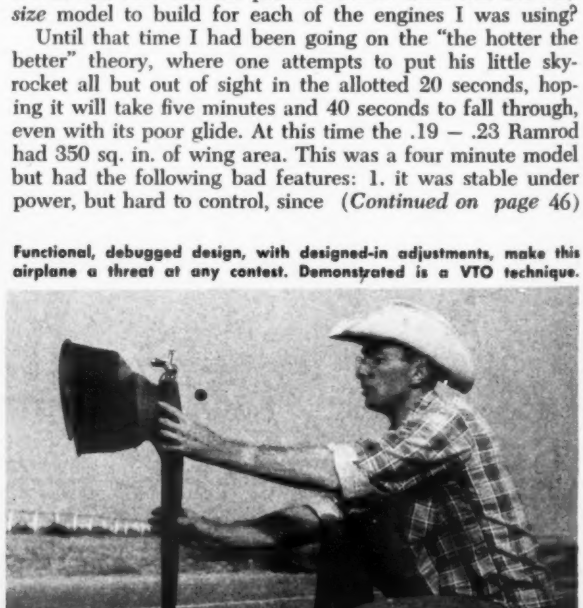
During the ensuing years, configuration was changed; construction was modified; airfoils were thickened; dihedral in tip sections was increased; tail and nose moment arms and stab percentage were reduced; pylon was shortened, then relengthened; retractable landing gears and one-bladed props were incorporated, then discarded; thrust line was raised, then relowered; that's enough to give you an idea.

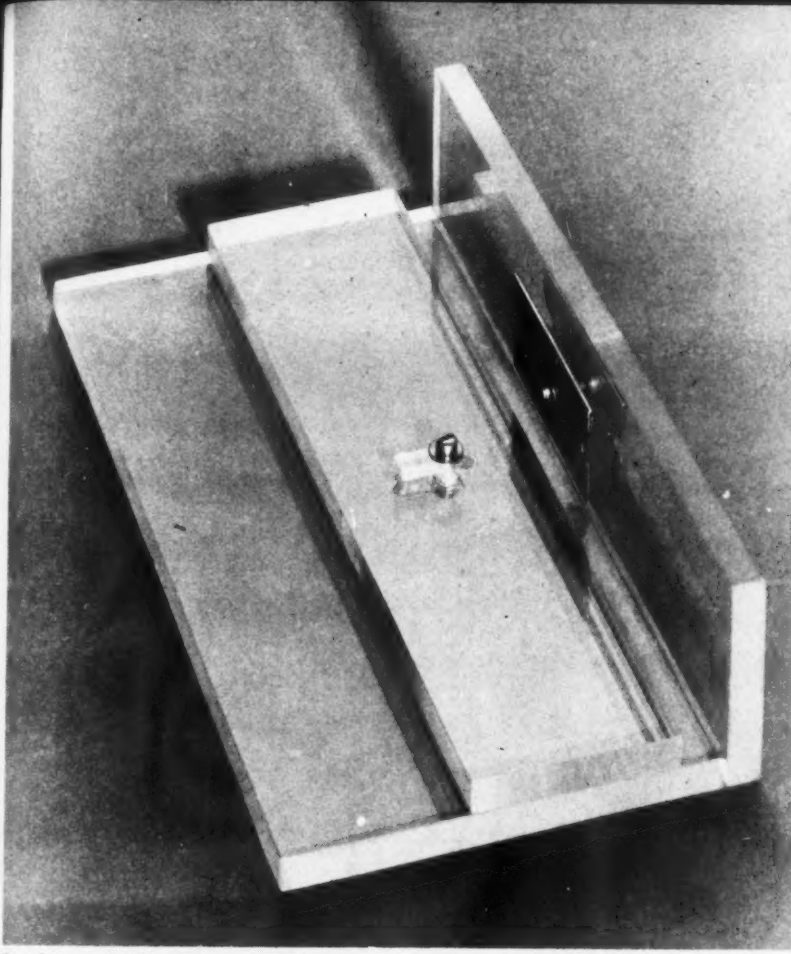
The design was not finalized until late in the fall of 1954, but at that time another problem arose: what was the best *size* model to build for each of the engines I was using?

Until that time I had been going on the "the hotter the better" theory, where one attempts to put his little sky-rocket all but out of sight in the allotted 20 seconds, hoping it will take five minutes and 40 seconds to fall through, even with its poor glide. At this time the .19 — .23 Ramrod had 350 sq. in. of wing area. This was a four minute model but had the following bad features: 1. it was stable under power, but hard to control, since (*Continued on page* 46)

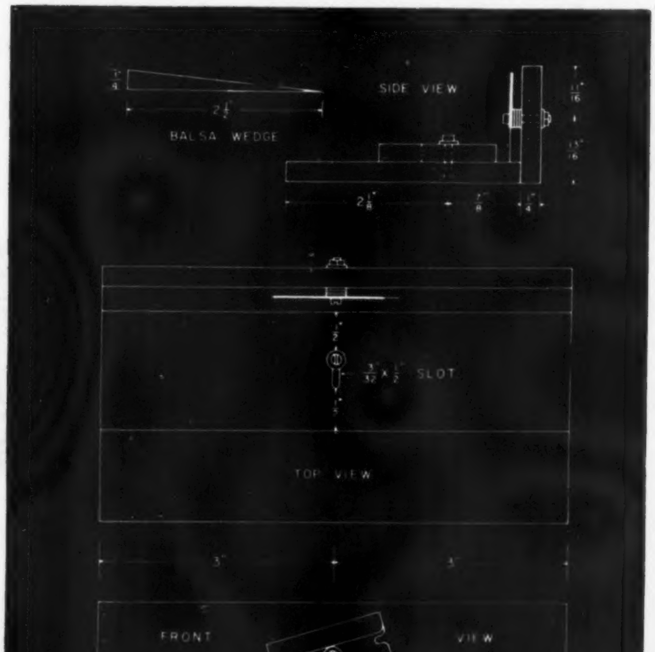
Method of mounting the Thermal Hopper. Note special tank and how the fuel line doubles back to the timer. Firewall tilted for downthrust.

Functional, debugged design, with designed-in adjustments, make this airplane a threat at any contest. Demonstrated is a VTO technique.





Two things make this stripper successful, whereas older ones gave trouble. Plastic has been substituted for hardwood and a small balsa block to hold rubber snugly against base.



STRIP YOUR OWN RUBBER

By JOE BILGRI

Here, thank goodness, is a way to make up any thickness of rubber for indoor models.

► For many years small rubber sizes have been a problem for clubs or individuals who fly indoor models of any type, so if you or your club is having rubber problems, here is a simple way to strip down rubber to the desired size—at the rate of better than 6 ft. per minute.

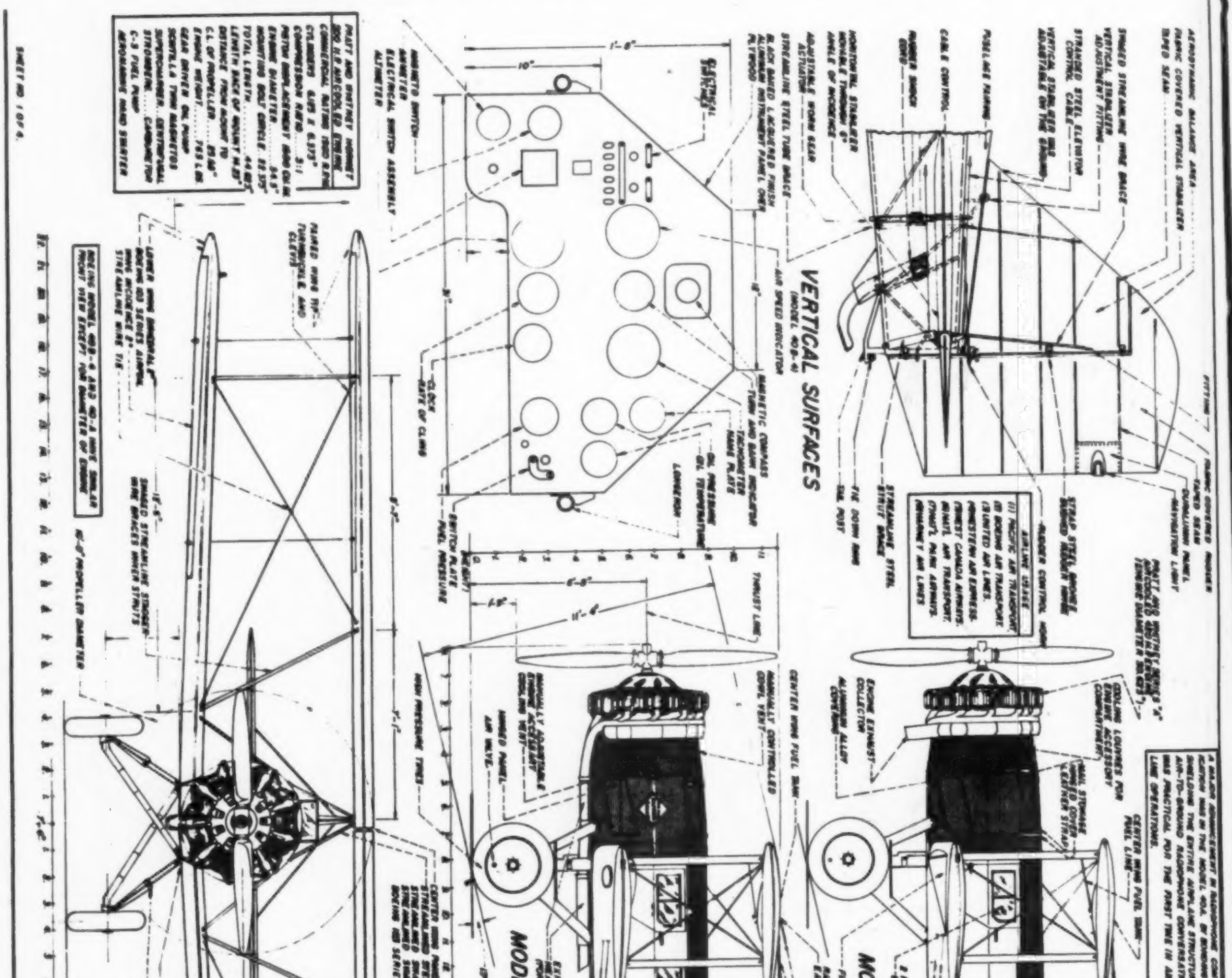
Some of you who already have an ample supply of indoor rubber will probably like to try some Pirelli rubber, which the Wakefield fliers have found to be more powerful than any other for indoor models and, judging from the way rubber allowance has been whittled down for Wakefield models, a stripper may soon be necessary to get your rubber down to the required weight.

While this new system may seem reminiscent of one formerly used in the past—without success—there are two features that contribute to this stripper's success and both of these were incorporated into a similar stripper by Jack Block of the Los Angeles Thermal Thumbers through whose cooperation, along with Joe Foster's photographs of this transparent gadget, this article has been made possible.

The first feature is the substitution of plastic for hardwood. I have tried both substances and feel it is hard to equal the smooth slick surface of the clear plastic materials, such as Lucite or Plexiglas, and this extra smoothness seems to be necessary to do a good job of rubber stripping. The second and, by far, the more important feature is the use of a balsa wedge block to hold the rubber snugly against the base of the stripper at the point where the rubber is being split, which also acts as a tunnel to keep the rubber flat.

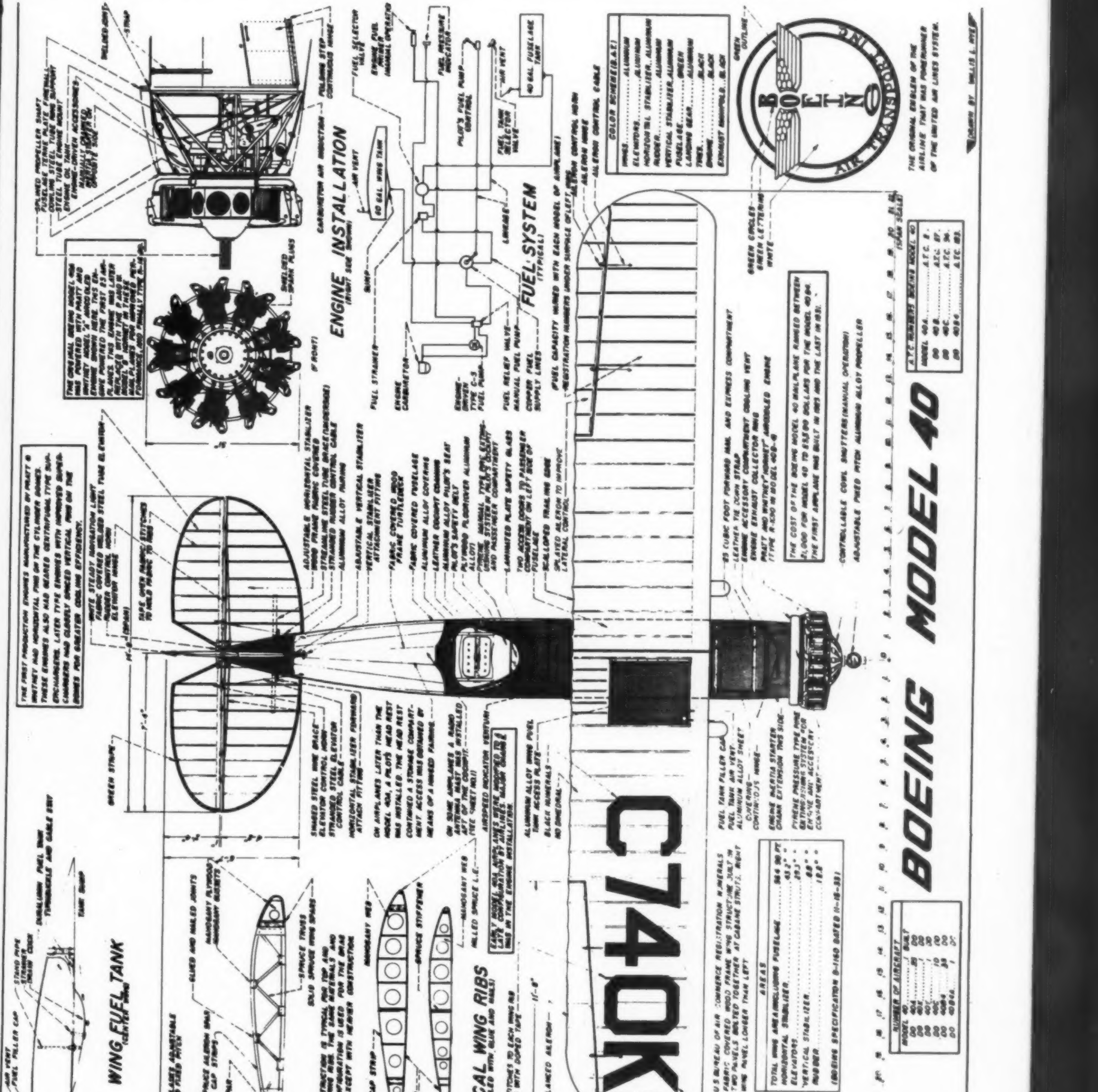
Before you begin to build, I'd suggest that, when you purchase your plastic material, you have the dealer cut the pieces (*Continued on page* 40)

BOEING 40—THE GREAT MAILPLANE OF THE 'TWENTIES.



Part 1—Page 1 of 4

THESE TWO PLATES BEGIN A TWO-PART PRESENTATION.



Gastove

By MICHAEL GASTER

What does it take to win the International Gas Event? This is a story of seven years of development—and a plan for building a great gassie.

► Toward the end of 1949, I decided to design a model with considerably higher performance than the usual Banshee or Slicker. By using a larger wing area and by keeping the weight down to about 16 oz., I estimated that I would not lose anything on the climb, the performance increase resulting from the low thermal catching glide. To improve the glide still further, I decided to use a thin, rather heavily cambered section of the Benedeck family to increase the maximum life coefficient and thus reduce the stalling speed. A thinner version of this same section with less camber was also used on the 33 per cent tailplane which was designed to carry its fair proportion of the load.

The model was built around an ignition Arden .199. The original design was for a fully planked fuselage combined with a partly cowled motor fitted with a spinner. However, on consideration of the weight involved, I used a tissue-covered structure of built-up diamond sections.

Gastove MK-1 came out at 16¾ oz. complete with ignition coil, battery timer and twin wheels; as can well be imagined, it was very weak and sloppy. The performance was quite promising but the model was unfortunately lost on its first day out because of a faulty timer.

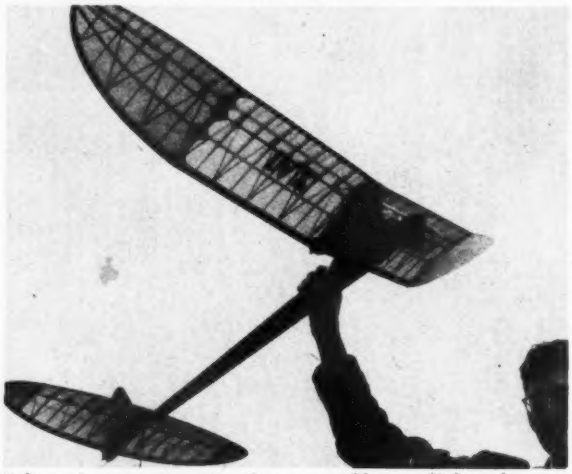
Following MK-1 I built three more models of the same type, all trying to follow the lightweight trend, but all were too weak and not one reached a contest in a fully trimmed condition. I decided to sacrifice a little performance to gain structural rigidity and thus a more consistent machine. Since the main weakness was in the tissue-covered fuselage, I tried a fully planked model as I had originally intended. The new model was a success; it flew well.

The year 1951 proved a very unlucky one for me for, although I built four fully planked models down to low weights, giving better and more consistent performances than before, I lost three before entering a contest. The remaining ship was my 880 sq. in. Hornet .60 model which, at 45 oz., was quite a handful to trim out.

After only two years, I had managed to get through 10 models with no success at all. After some very careful thought, I came to the conclusion that, although my models were capable of putting up the times required, they did not hold their trim well enough and thus were still too inconsistent. Therefore, the structural stiffness was increased mainly in the flying surfaces where more ribs and spars were added.

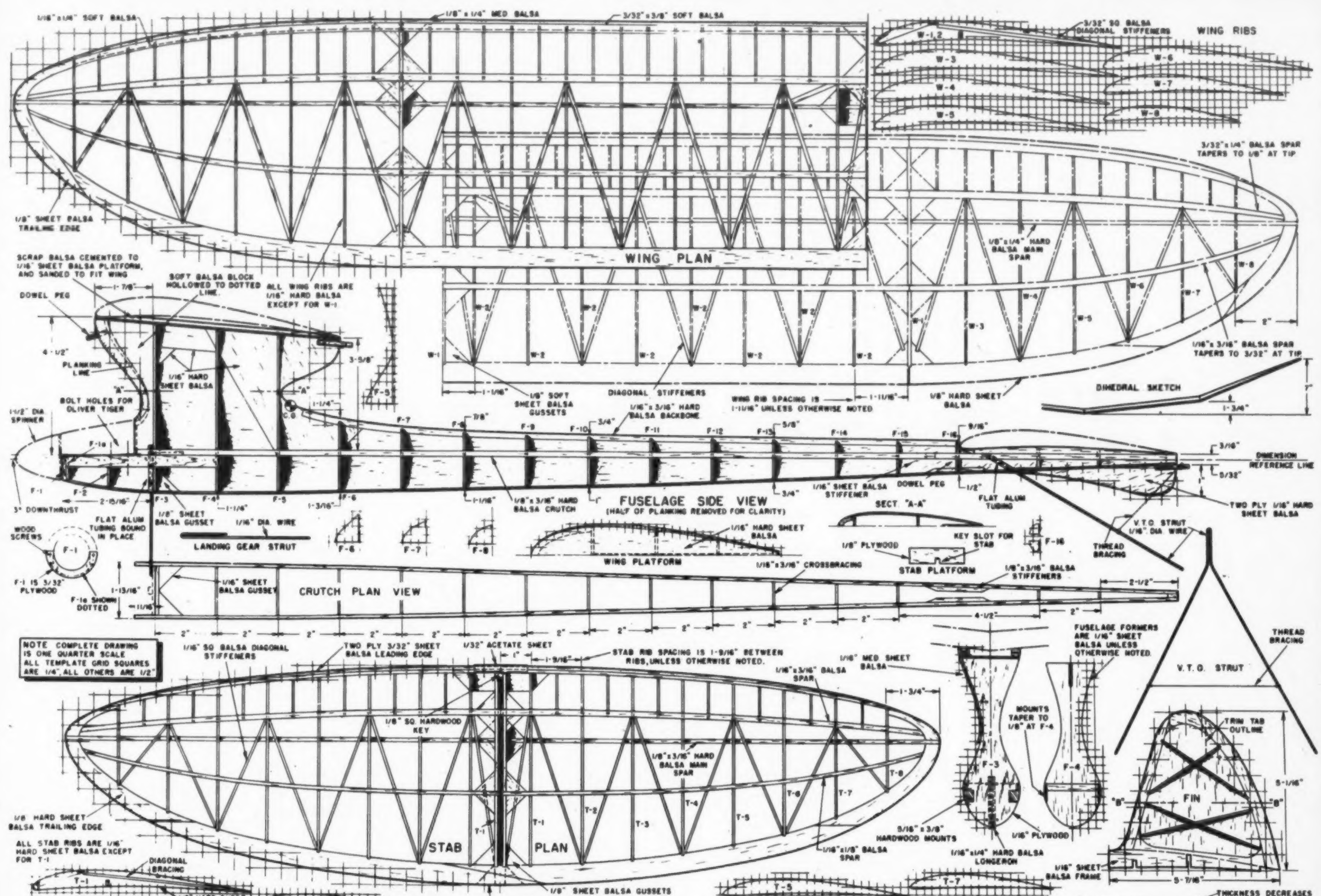
When the FAI rules came through, I decided to try and make one model to these specifications although college work conflicted. The model turned out to be my biggest flop for, although it was strong enough to sustain two seasons of hard flying, its performance was quite hopeless. I tried four motors of various sizes from 1.5 cc to an Elfin 2.49 in an endeavor to produce a reasonable climb. The model was then lost. (*Continued on page* 38)

Graceful, clean lines of the model that beat all others at the German finals, here apparent. Gaster, 1957 rules in mind, looks sad.



Light, anti-warp construction always a problem on high performance free flights. Selection of light, but strong, wood becomes important.

VTO'ing in the later afternoon shadows on famous fly-off flight, the Gastove gets away easily. We'll miss those dramatic fly-offs in '57.



WING RIBS
WING PLAN
FUSELAGE SIDE VIEW
(HALF OF PLANKING REMOVED FOR CLARITY)
CRUTCH PLAN VIEW
LANDING GEAR STRUT
WING PLATFORM
STAB PLATFORM
SECT. "A-A"
DIHEDRAL SKETCH
V.T.O. STRUT
FIN
SECT. "B-B"
STAB
PLAN
STAB RIBS
NOTE COMPLETE DRAWING IS ONE QUARTER SCALE ALL TEMPLATE GRID SQUARES ARE 1/4", ALL OTHERS ARE 1/2"
1/16" x 1/4" SOFT BALSA
1/8" x 1/4" MED BALSA
3/32" x 3/8" SOFT BALSA
3/32" SQ BALSA DIAGONAL STIFFENERS
3/32" x 1/4" BALSA SPAR TAPERS TO 1/8" AT TIP
1/8" SHEET BALSA TRAILING EDGE
1/8" x 1/4" HARD BALSA MAIN SPAR
SCRAP BALSA CEMENTED TO 1/16" SHEET BALSA PLATFORM, AND SANDED TO FIT WING
SOFT BALSA BLOCK HOLLOWED TO DOTTED LINE.
ALL WING RIBS ARE 1/16" HARD BALSA EXCEPT FOR W-1
DOWEL PEG
PLANKING LINE
1/16" HARD SHEET BALSA
BOLT HOLES FOR OLIVER TIGER
1-1/2" DIA SPINNER
1/8" SOFT SHEET BALSA GUSSETS
DIAGONAL STIFFENERS
1/16" x 3/16" HARD BALSA BACKBONE
WING RIB SPACING IS 1-11/16" UNLESS OTHERWISE NOTED
1/8" HARD SHEET BALSA
1/16" x 3/16" BALSA SPAR TAPERS TO 3/32" AT TIP
DIMENSION REFERENCE LINE
3" DOWNTHRUST
FLAT ALUM TUBING BOUND IN PLACE
1/8" SHEET BALSA GUSSET
1/8" x 3/16" HARD BALSA CRUTCH
1/16" SHEET BALSA STIFFENER
FLAT ALUM TUBING
TWO PLY 1/16" HARD SHEET BALSA
WOOD SCREWS
F-1 IS 3/32" PLYWOOD
F-1a SHOWN DOTTED
1/16" DIA. WIRE
1/16" HARD SHEET BALSA
1/8" PLYWOOD
KEY SLOT FOR STAB
V.T.O. STRUT 1/16" DIA WIRE
THREAD BRACING
1/16" SHEET BALSA GUSSET
1/16" x 3/16" CROSSBRACING
1/8" x 3/16" BALSA STIFFENERS
1/16" SQ BALSA DIAGONAL STIFFENERS
TWO PLY 3/32" SHEET BALSA LEADING EDGE
1/32" ACETATE SHEET
STAB RIB SPACING IS 1-9/16" BETWEEN RIBS, UNLESS OTHERWISE NOTED.
1/16" MED SHEET BALSA
1/16" x 3/16" BALSA SPAR
FUSELAGE FORMERS ARE 1/16" SHEET BALSA UNLESS OTHERWISE NOTED.
1/8" SQ HARDWOOD KEY
1/8" x 3/16" HARD BALSA MAIN SPAR
MOUNTS TAPER TO 1/8" AT F-4
TRIM TAB OUTLINE
1/8 HARD SHEET BALSA TRAILING EDGE
5/16" x 3/8" HARDWOOD MOUNTS
1/16" PLYWOOD
1/16" x 1/8" BALSA SPAR
1/16" x 1/4" HARD BALSA LONGERON
ALL STAB RIBS ARE 1/16" HARD SHEET BALSA EXCEPT FOR T-1
DIAGONAL BRACING
1/8" HARD SHEET BALSA
1/8" SHEET BALSA GUSSETS
1/16" SHEET BALSA FRAME
1/8" PLYWOOD KEY
RIBS FORMED FROM 1/16" x 1/4" BALSA CEMENTED TO 1/16" SQ BALSA DIAGONALS. COVER FIN WITH 1/16" SHEET
THICKNESS DECREASES TO TIP
1/16" SQ BALSA
P. D. G.

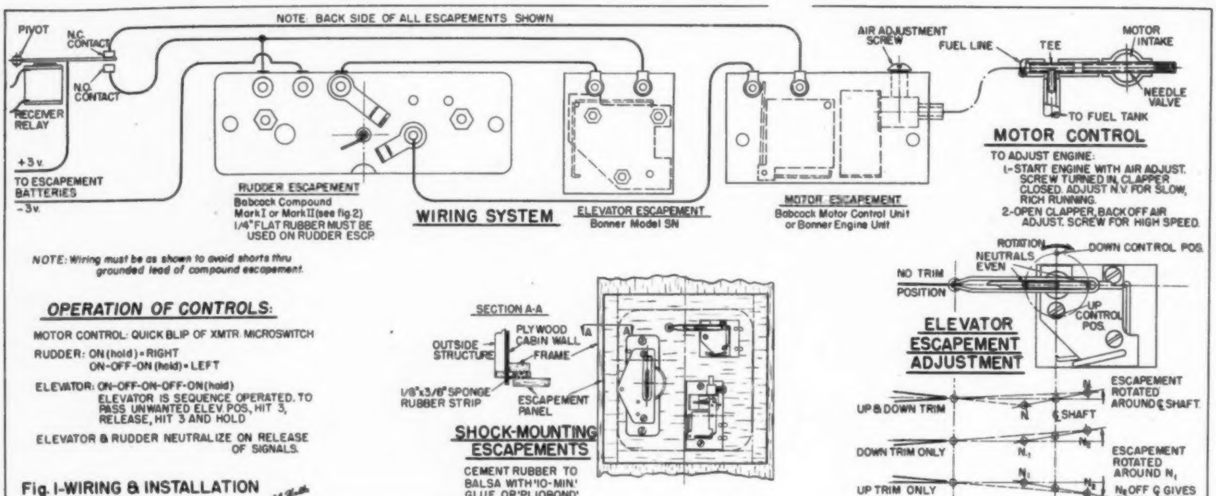


Fig. I-WIRING & INSTALLATION

Triple Escapements

. . . By EDWARD H. YULKE

Comes a time in every RC fan's life when he wants extra controls. Here's independent rudder, elevator, engine, using escapements.

► This system of multiple escapements provides all three controls for single-channel: rudder, elevator and motor control, with the addition of only one simple contact to a standard Babcock compound escapement.

Criteria for working out this system were: (a) motor control that could be left in high or low, independently of elevator position, (b) elevator control that provided up, down and trim in neutral (exact neutral after up-control, a few degrees of down after down-control for wind penetration), (c) rudder control.

Too many systems developed recently either had the limitation of engine control tied to the elevator neutrals or involved rather complicated rework of escapements. The elevator control is a standard Bonner SN. The motor control is simply a Babcock or Bonner motor control unit.

The extra contact added to the Babcock compound has an added advantage. Like the original contact that is installed by the factory, this new contact is a wiping-arm type that never needs cleaning and thus needs no "quench circuit" across the points for reliable, continuous performance.

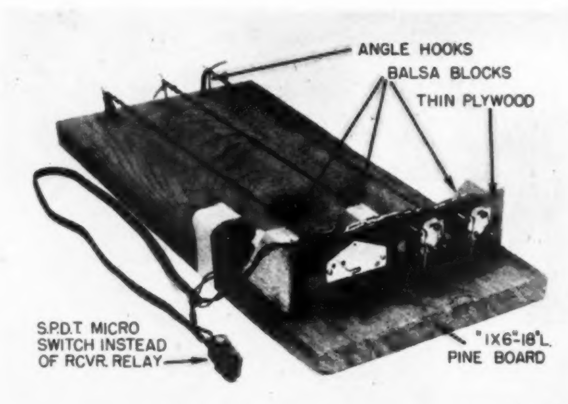
Some fellows will want elevator trim positions; others will not. If you feel you'd like to have both neutrals equal: that is, elevator returning to the same position after up or down, simply eliminate the offset position of the escapement, as shown in Fig. 1. Make the center of the torque shaft, the center of the escapement shaft and the center of the drive pin at neutral *exactly* in line.

The drawings are self-explanatory, but perhaps a few notes are in order. It is suggested the two bolts that hold the front escapement plate of the Babcock be removed and the timing shafts and front plate taken off for simplicity of working, when installing the new contact: Fig. 2, Step 1. It can be done with the escapement assembled, if a 2-56 (¼ in. L) screw and nut are used to hold the contact in place instead of the eyelet, as called for on the plans.

The contact is cut from .010 copper or hard brass. Fig. 2 shows where and how to locate the contact. Make sure that the wire on the shaft makes good wiping contact, but that the contact is not so high that the wire drags on the slope of the bend. Adjust the height so that the wire arm will deflect the contact just about 1/32 in. You can compare this with the contact already on the escapement if you are in doubt about it.

The test rig shown in the photo is something we'd suggest building. The short time and few pieces of material required are well worth the effort, particularly if you are not too familiar with compound escapements. With a few pencells wired to a SPDT micro switch, you can play with it for hours and be thoroughly familiar with the system before you get it in a plane and on the field.

Far more than just a plaything or even a "trainer" for the system, the test rig is just that: a place where you can test the whole deal before it is in a plane. Escapements should be checked before mounting them in the plane and



Babcock compound, left, for rudder; two Bonner SN's, for flippers and engine. Quick blip for engine. Breadboard rig always good for testing.

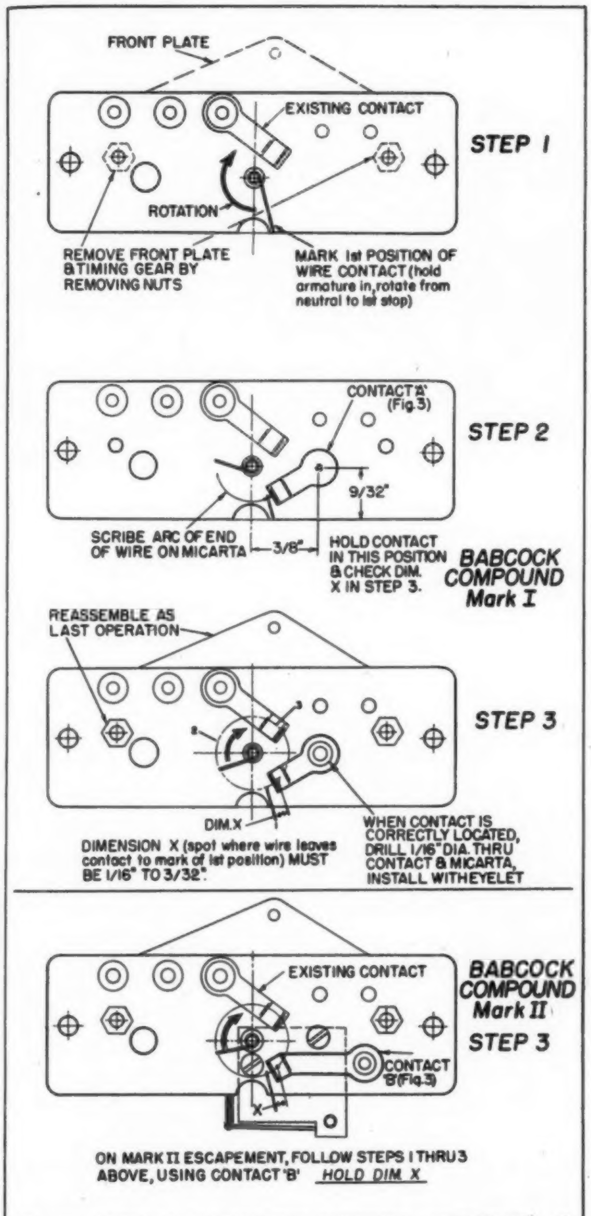
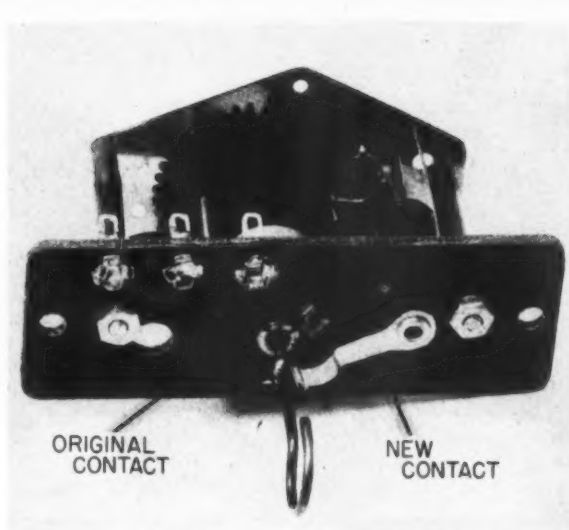


Fig. 2 - INSTALLING MOTOR CONTROL CONTACT



The original and new contacts as arranged on the compound escapement. All controls self-neutralizing. Unequal elevator neutrals for trim.

they should be tested with full rubber turns in the motors to give the maximum friction you will encounter in the airplane on the field.

It is extremely important to see that the elevator escapement pulls in at no more than 1.8V, because this escapement pulls in while the rudder escapement is held on third position. The motor escapement pulls in after the current is cut from the Babcock escapement coil. Thus, when elevator is used, two escapements are drawing current. As the batteries are used in flight after flight, this load pulls the current down farther and farther until the batteries drop to 1.8V, under load, at which time the Babcock will pull in, but not the elevator escapement.

This is not as bad as it sounds; in fact, it is a positive indication of low batteries without a chance of having a fly-away without warning. This is what to watch for: motor control and rudder control will continue to work perfectly after you hit the point where you cannot get elevator. There may not be enough juice left in the batteries to operate the combined load of rudder escapement and elevator escapement, but there will be a safe margin to insure reliable control of motor or rudder, since they draw current singly. The first time you cannot get elevator in the air, simply hit motor control (to low speed) and head for a landing.

On the Babcock Mark I compound use the heavy spring of the two supplied and ¼ in. rubber. Using these will insure not getting engine control inadvertently when signaling for something else. The heavy spring is designed for 3V and will insure snappy escapement action; the ¼ in. rubber will insure fairly fast rotation that will get the wire past the motor control contact unless you hit the switch fast deliberately to get motor control. The Babcock Mark II also needs ¼ in. rubber but the spring is designed for this load.

A few notes are probably in order regarding the receiver and relay. Since the motor control gets its current through the back (normally closed) contact of the relay, you must be certain that there is sufficient spring tension to insure good contact. Where a two-tube receiver is used and you have a range of 0-3 mils current change to operate the relay, we have found that having the relay pull-in at 1.8 mils and drop-out at 1.2 mils gives the most reliable operation. Out of the 3 mils current change, this leaves a 1.2 mil margin above and below the operating range. The .6 mil gap is sufficient to eliminate trouble from vibration unless you are flying with half a prop.

The diagrams show the signals needed to get what you want. We suggest you try it, then fly it!

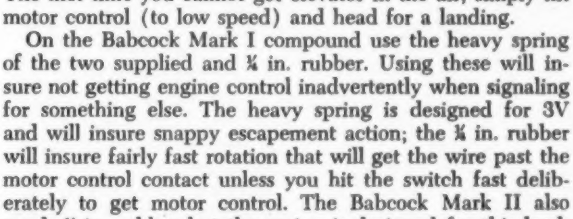
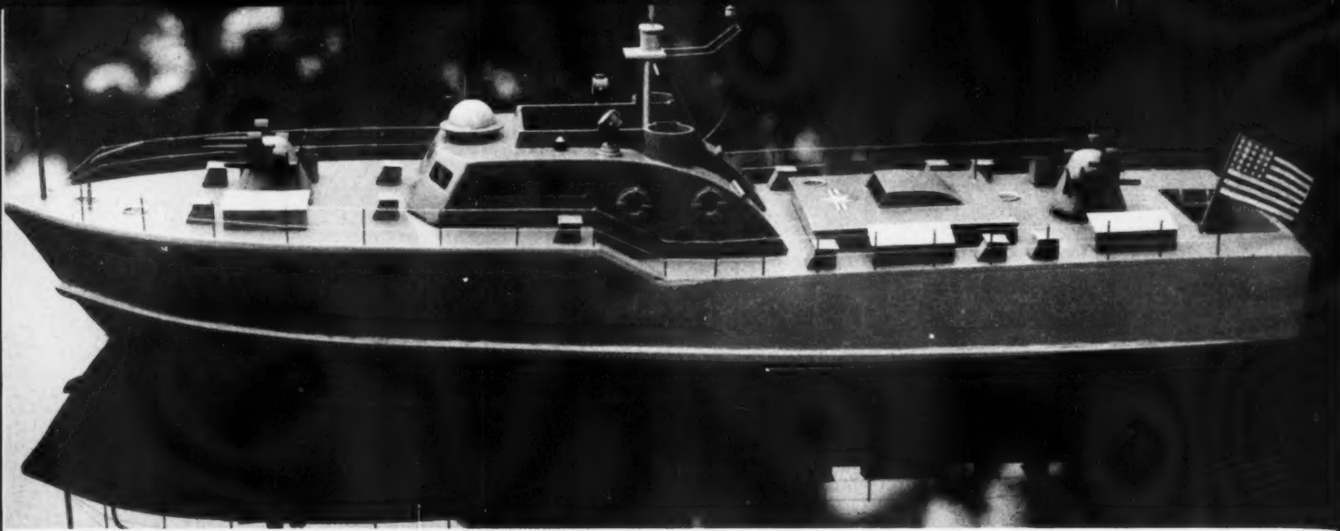
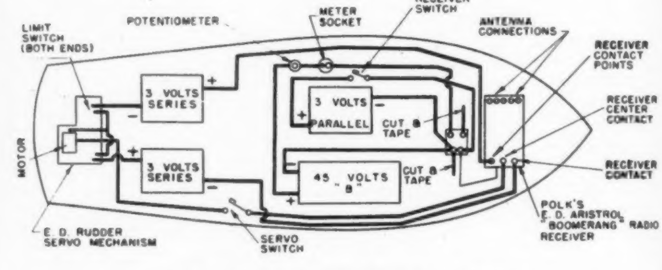


Fig. 3 - CONTACTS (full size)



When an Air Force airplane has to ditch, this high-speed craft may save the crew—under fire, if necessary. This is a model—electric or gas drive.

Checking out the radio before a fast test run, the designer works the "left-right" control box to which the rudder servo slaves. Big boat!



RADIO RECEIVER AND RUDDER SERVO WIRING DIAGRAM

AIR FORCE RESCUE CRAFT

By WALTER A. MUSCIANO

Because radio control fans often have need of a boat, MAN presents this special item.

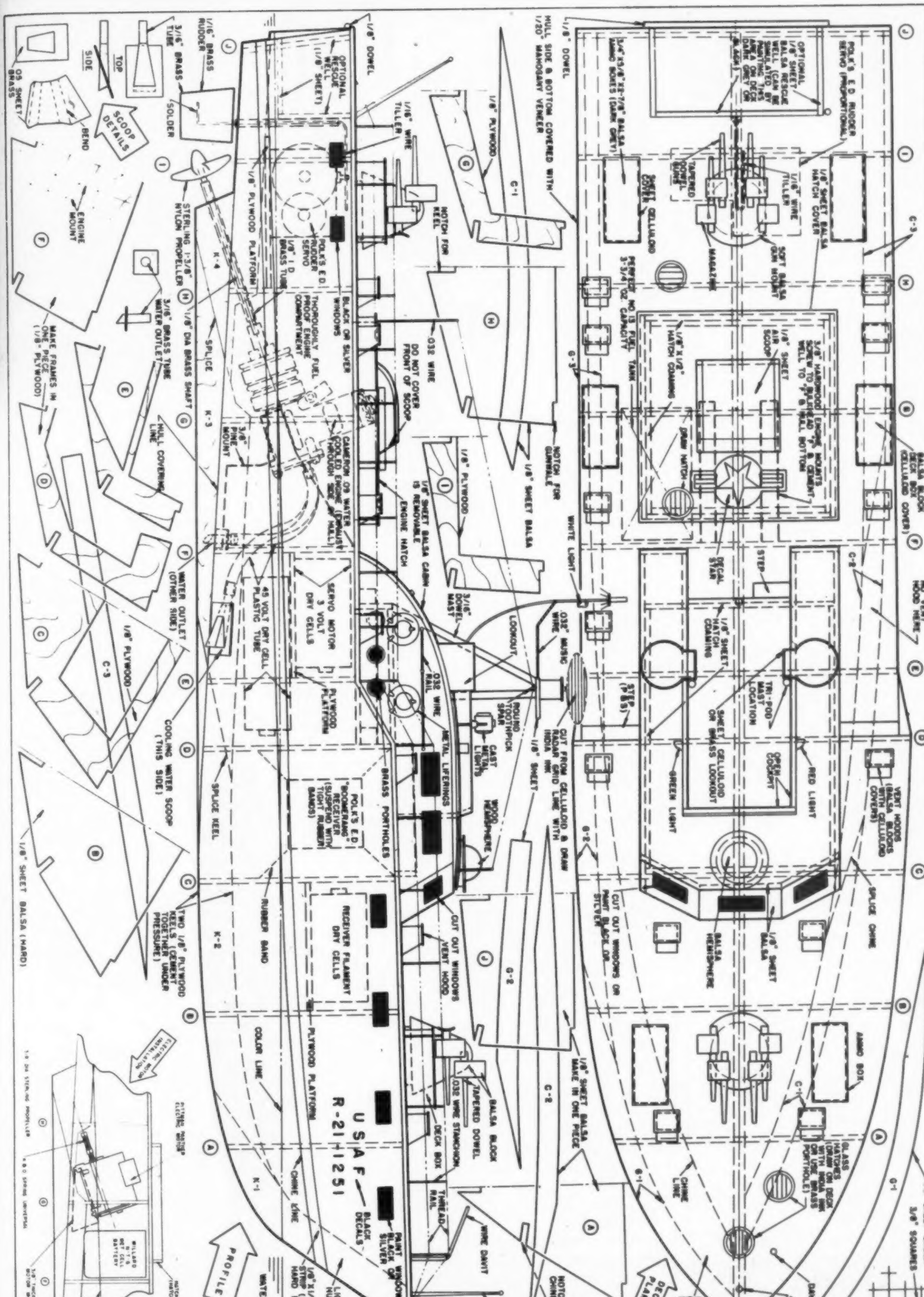
► The fastest types of water craft used by the United States Armed Forces are the Air Force Rescue Boats. These sleek, life saving craft are designed to rush quickly to the scene of a plane crash in water and rescue the occupants of the downed airplane.

Our model was built to the scale of 1/3 in. to the foot. The full size triple-screw craft was built by Detroit Basin, Inc. and is powered by three 1,500 hp Packard 12-cyl. V-type gasoline engines.

The crew consists of 14 men and two officers. A sick bay is provided for the crash victims and will accommodate 12 litters. In order to facilitate hauling aboard downed fliers, a gate or ramp is fitted in the transom. The fliers are then moved into a well in the stern which opens directly into the sick bay.

We wish to express our thanks to the following for their kind cooperation that made this presentation possible: Mr. D. B. Sutherland of Detroit Basin, (*Continued on page 48*)

This they-went-thataway shot shows how well the Cameron water-cooled marine engine drives the craft. Escapement rudder is not advisable!



FULL SIZE PLANS AVAILABLE. SEE PAGE 48.

the MAN .19

Part Three

By E. C. MARTIN

Winding up actual construction. Supplementary article on break-in for next month.

Editor's Note: *In the April and May issues, Mr. Martin described the tools, material and operations up to the piston, which begins this installment.*

Piston

Chuck the piston material in the three-jaw and machine the inside to drawing. Turn the outside diameter to size plus 1/32 in. and chamfer the end 1/32 in. x 45°. Cut into the material on the same set-up so as to form the piston crown, but leaving about 3/16 in. dia. in the center still holding the work to the stock. Using a round nosed tool at high speed with very fine feed, turn the OD progressively with light cuts until the chamfer on the cylinder bore begins to lock with that on the piston skirt. Now proceed extremely carefully, taking the tiniest cuts possible until the cylinder can with difficulty be eased onto the piston. Clean and oil both components thoroughly and then, holding the cylinder firmly, work them together with the lathe running, taking care not to let them grip. After a short time they will slide with very little resistance, but will grip if relative movement ceases. At this point they are ready for use.

Remove stock from chuck and grip in vise. File curve in skirt to drawing and drill wrist pin hole 11/64 in. dia. and ream to 3/16 in. with stock resting in Vee-block. Saw piston from stock, clean up the crown with a file and remove all burrs.

Con Rod

Take the ½ in. dia. x 3 in. dural rod and cut in half. Chuck one piece in four-jaw lengthwise so that center comes in roughly mid-length position and the ends in relation to the chuck jaws show the material to be at right angles to the bed. Face ⅛ in. off and remove from chuck.

Rest stock on flat and center pop bearing centers, taking great care to assure accuracy, and drill and ream to drawing, making sure both bearings are parallel.

Turn up mandrel for big end and finish-machine both faces as far along the shank as possible before slippage occurs.

Turn up mandrel for small end and repeat Stage 3.

Remove from mandrel and saw and file to finished dimensions.

Fit bearings to crankpin and wrist pin, lapping if necessary.

Contra Piston

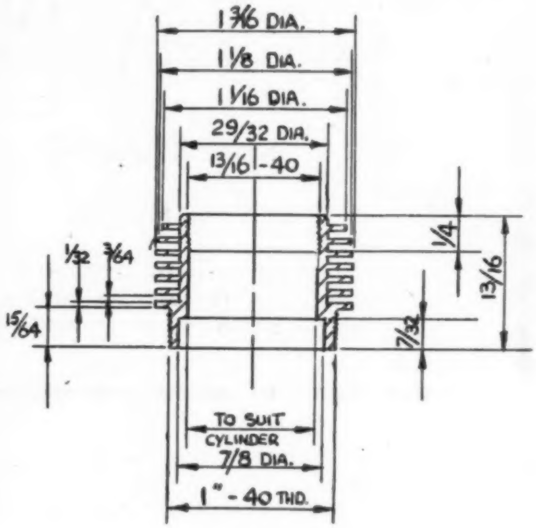
Set up remaining piece of cast iron or Meehanite, projecting ¾ in. from three-jaw, and face and chamfer 1/16 in. x 45°. Turn OD down to 11/16 in. dia. and, using round nosed tool with the lightest possible cuts and testing with cylinder between each, carefully work down until cylinder will grip. Clean and oil both parts and try again. If the cylinder seems likely to go at a light tap, the contra piston OD is probably satisfactory.

Finish-machine to drawing and remove burrs on same set-up, but cut into stock behind component so as to leave a ⅛ in. dia. shank about ⅜ in. long, and cut off.

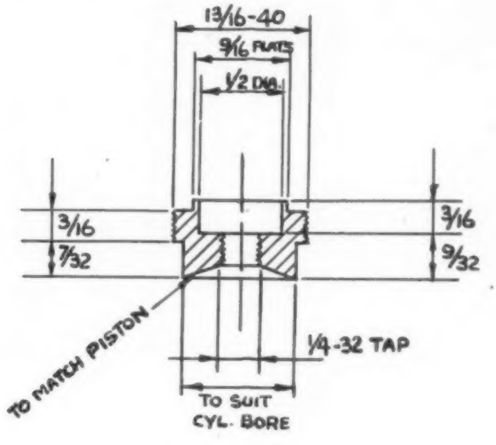
Try part in cylinder and tap lightly into position, taking care not to tilt or jam the parts. At this stage the engine can be partially assembled and it will be found that the ⅛ in. shank on the contra piston will project through the compression screw hole in the head. Clamp a prop onto the crankshaft and, with a little oil in the cylinder, flip prop to check that contra piston moves without using excessive force when a hydraulic lock occurs. Tap the shank end and flip repeatedly until satisfied, then remove head and check for compression leakage past contra piston. If the fit is definitely too tight, the ⅛ in. shank can be used for chucking, while the OD is eased slightly with a small oilstone. It is unwise to use emery paper. Having achieved the desired fit, the shank can be removed and the part gripped lightly in the chuck for cleaning up interior.

Compression Screw

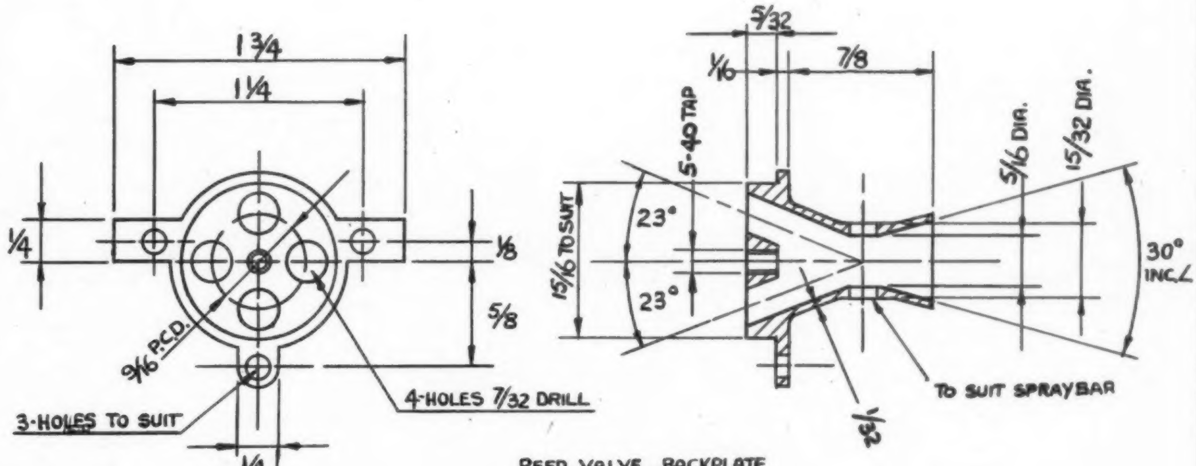
This part is not detailed as it simply consists of a (*Continued on page* 43)



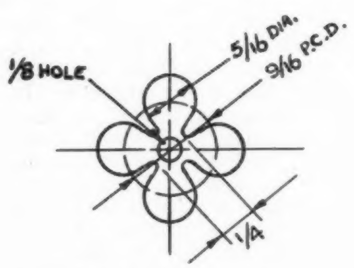
CYLINDER BARREL (GLO HEAD)
DURAL 1 REQ'D



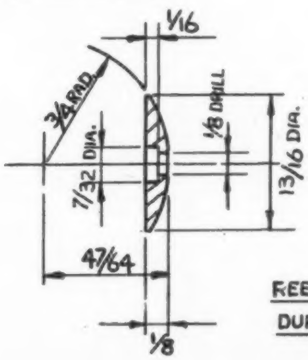
GLO HEAD
DURAL 1 REQ'D.



REED VALVE BACKPLATE
DURAL 1 REQ'D



REED VALVE
.002 STEEL SHIM 1 REQ'D



REED RETAINER
DURAL 1 REQ'D.

MAN. 19 12.2.54 E.C.M.

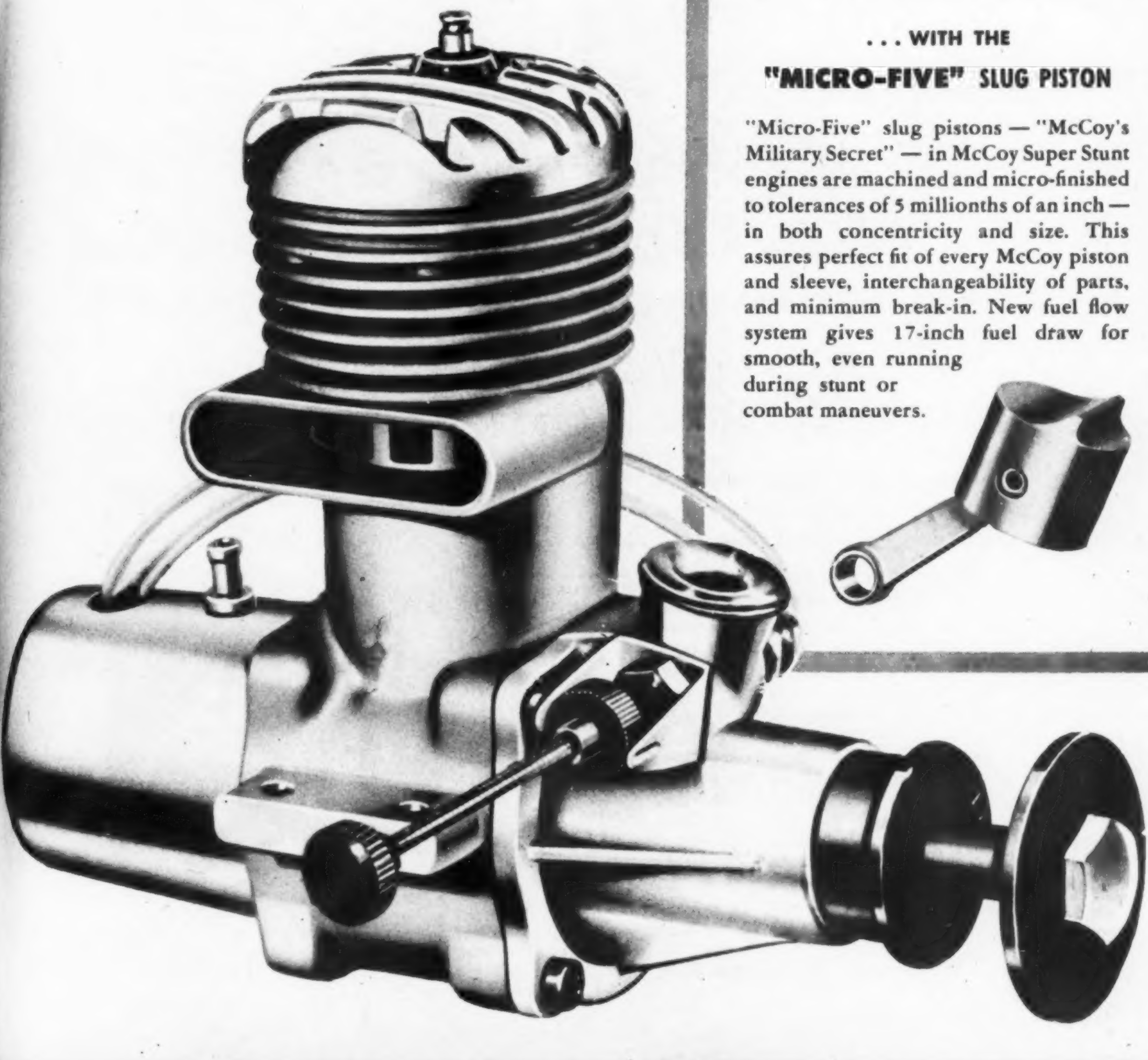
Lowest-priced "29" on the market...

McCOY®

Super Stunt 29 at $7.95

Here you see the famous McCoy Super Stunt "29" . . . *lowest-priced "29" on the market* and companion in size and price (but with .359 Displacement) to the equally famous McCoy "36." Think of it! Just $7.95 . . . and it features all the well-known, performance-proved McCoy power, ruggedness, and dependability for stunt, free-flight, combat and team racing. That's right! Guaranteed full power . . . guaranteed easy starting . . . and runs like a jack rabbit with the sensational new McCoy "Micro-Five" slug pistons. Want proof? Get your McCoy Super Stunt "29" or "36" now . . . see for yourself and be convinced!

and more than ever your greatest value for quality, easy starting, power and dependability!



. . . WITH THE

"MICRO-FIVE" SLUG PISTON

"Micro-Five" slug pistons — "McCoy's Military Secret" — in McCoy Super Stunt engines are machined and micro-finished to tolerances of 5 millionths of an inch — in both concentricity and size. This assures perfect fit of every McCoy piston and sleeve, interchangeability of parts, and minimum break-in. New fuel flow system gives 17-inch fuel draw for smooth, even running during stunt or combat maneuvers.

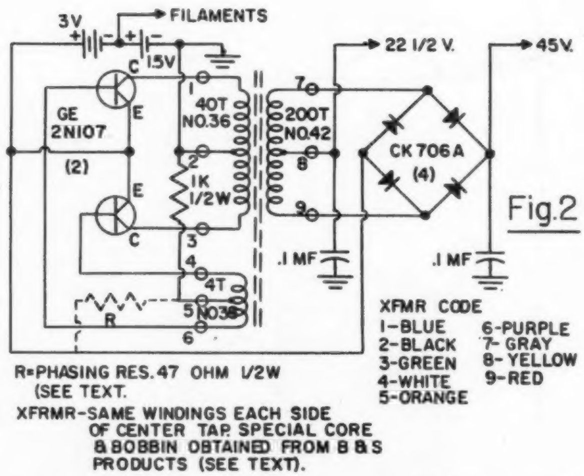
TESTOR CHEMICAL COMPANY · ROCKFORD, ILL.

DURO-MATIC PRODUCTS COMPANY DIVISION

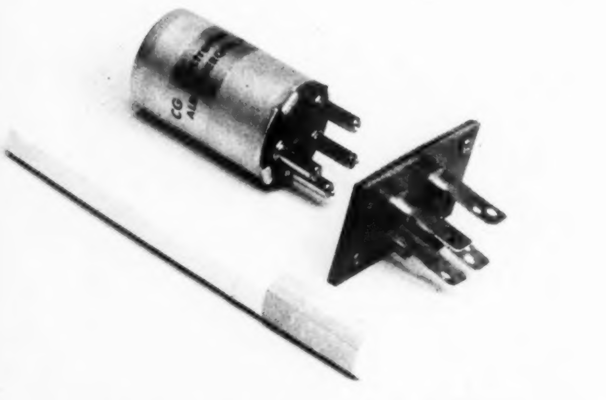
Nice looking RC model built in Japan has a five-foot wingspan and the all-up weight is 3¾ pounds. Equipped with rudder and motor control.

By E. J. LORENZ

Radio Control News



Schematic of transistorized receiver power converter by Brunson, Schweitzer. Size of this power converter less than hearing aid battery.



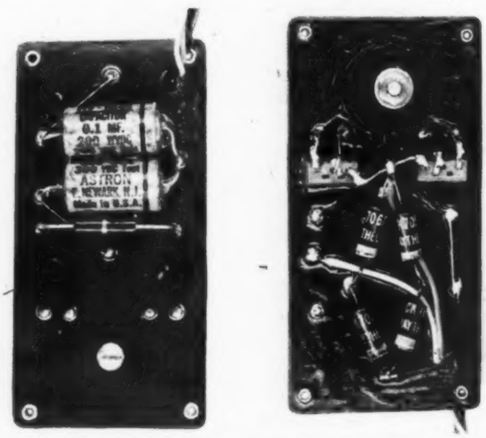
It it's selective tone you are looking for—good for flying more than one ship at a time—this single reed by CG Electronics is interesting.

So help us, they now have a transistorized receiver power converter. So much cooking that we should not forget to build and fly.

CLUB NEWS

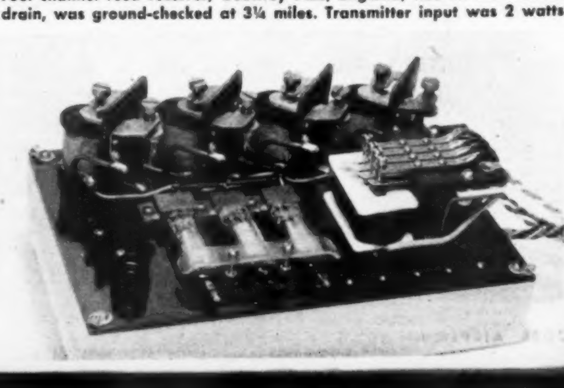
► Spring is nearly over and reports coming in indicate that a busy summer is ahead for the RC fan. With all the open country from the Dakotas down to Texas, it is a wonder that no one has at least attempted an unofficial crack at some RC world record. With P. Velitchkovski, a Russian, exceeding the requisite two per cent increase for a world record, he has chalked up a time of three hours, six minutes and 38 seconds. Also in the record field we have Jean-Pierre Robeaux of Belgium who set an RC record of 1,142 meters above the point of departure. This is an altitude of about 3,778 ft. Why doesn't the U.S.A. have an RC record under its belt? We're quite sure it is not the fault of the American builder or of his equipment. Could it be the "red tape" and expense required to comply with regulations? Maybe something can be done about it and then we'll be out for some records.

The New England RC Modelers, 23 Lantern Lane, Wellesley Hills, Mass., with John K. Ross as president, is out drumming up membership. As in other parts of the country, "everyone talks about the weather but no one does anything about it"—meaning that the interest in RC work is there but members just don't get around to attending the meetings. A system which sounds good to us is being proposed by this group. Since they have members in neighboring states, it is proposed to divide the club into several local wings, consisting of about five or more local members. Local flying would be informal and club contests would be on a decentralized (*Continued on page* 52)



Top and bottom views of the transistorized power converter. Using but three pencells, it provides either 22½ or 45 volts. Tested six months.

Four-channel reed receiver, Geoffrey Pike, England, has 45 ma filament drain, was ground-checked at 3¼ miles. Transmitter input was 2 watts.



FOREIGN NOTES

A monthly world-wide round-up of technical developments, designs, significant industrial products.

P. G. F. CHINN

Holland

Latest RC news from Europe is that the Typhoon firm of Amsterdam has a really elaborate multi with pneumatic controls in the final test stage.

The receiver is a conventional three-tube chassis and is coupled to a six-reed unit. The reeds actuate the six air valves of a vacuum servo system which operates rudder, motor and elevator. The system incorporates a reservoir and three double-acting diaphragm units which are stated to exert a pull of some 10-12 oz. Power for the system is derived from a vane type pump which can be installed in the back of the crankcase of either of the two Typhoon Diesel .15 engines at present on the market. Weight of the complete gear is not stated, but it would appear to be moderate as the test model in which it has been installed and which has a wing area of 620 sq. in., weighs only 56 oz. fully equipped.

Australia

Following our provisional report last month, full official results of the Ninth Australian Nationals have now come in and contain some interesting facts. In Australia just now, high thrustline seems to be making one of its periodical incursions into King Pylon's free flight territory — and with some success. Australian National Champion, Ron Bird, for example, flew a high thrustline job powered by a German Webra Mach-1 Diesel.

Australians use American, British, German, Italian and Japanese engines, as well as their own Sabre motors, so it is interesting to see how all these shape up in competition with each other. In the Class A (.15 cu. in.) team race, for example, the American K & B .15 was matched against the Jap OS Max-15 and the British Oliver Tiger. The Japanese job was faster than any, but the better consumption of the Oliver put it in first place with the K & B second. The Class B final was an all-K & B .29 event. The Class C event went to an Australian Sabre .49-powered model.

In a well attended open stunt contest, winner Ken Castle used only a Frog 500 (inexpensive six-year-old British glow plug .30) in competition with the Fox .35's of the favorites. In FAI free flight, Japanese OS .15's took first and fourth places and a British DC 350 Diesel was used by the RC winner, along with ECC radio. Malcolm Sharpe's Dooling .61 won the Class III speed at 135.9 mph. with an Italian Super-Tigre G.24 in second spot at 124.1 mph.

Japan

Although RC is not yet widely popular in Japan, development continues apace. Latest item is a compound escapement and motor control unit from the OS people. Equipment is the 27.255 mc Minitron single-tube type. OS also have a two-tuber under development. A Max-15 motor is installed, fitted with two needle valves.

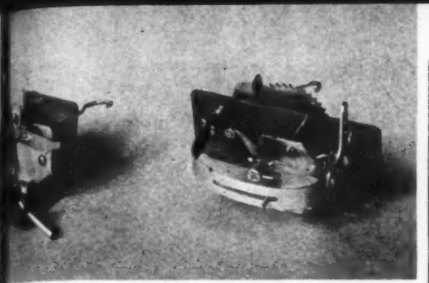
The model has a span of 59 in. and is 36½ in. long. Wing area is 3.42 sq. ft. and gross weight 59 oz., giving a loading of 17.7 oz./sq. ft. The receiver is packed in foam rubber in the front part of the cabin. Behind it, on a bulkhead, is the motor control unit and farther back is the compound escapement. This escapement, basically similar to the Bonner, has a linkage which converts the rotary motion into a back and forth movement for the rudder control. Thus, rudder movement is effected via a simple pushrod and horn.

Hungary

As we mentioned last month, Hungarian modelers, unlike those of other Iron Curtain countries, have used Western motors freely in contests and with some good results. Last year, Hungary won the big Russian-sponsored eight-country International meet. We don't know how officialdom views such minor boosts for products of the Decadent West, but we hope that any disapproval on this account of our unwitting ambassadors will be mollified by the fact that Hungary has, at least, taken a few steps farther forward in the modeling world than most of her neighbors, for now Hungary alone among the Soviet countries seeks to export her own model engines — even to the West.

To be candid, we don't think the latter

Vibra-Matic induction system on new Frog .09 Diesel, described last month, gives more power and better fuel consumption than the more orthodox shaft-valve engines. Rear venturi is a neat deal.



Latest in compounds and motor control units is this item by Japanese OS. Will work a pushrod.

plan will get very far and, certainly, American manufacturers have nothing to fear from competition from this quarter but, in view of the Hungarians' own readiness to use Western motors and forget about politics, we feel we owe them a fair crack of the whip and we wish them the best of luck in selling their motors to their Iron Curtain Comrades. Main Hungarian type involved at present is the Aquila series made by the Vella Brothers of Budapest. Recently, we examined and tested two new Aquila Baby .06 cu. in. Diesels. This is quite a pleasing little engine, a bit rough in places and, as we might expect, hardly up to American production standards, but the design is sound and, with some structural modifications, could be brought up to a standard where it might compete with other European 1 c Diesels.

Israel

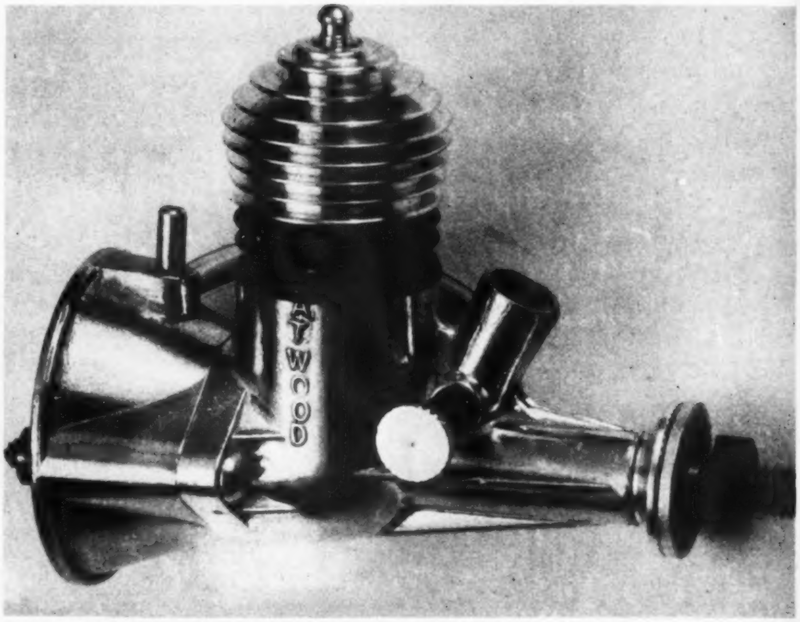
As in so many other countries, shortage of foreign currency, particularly dollars, and the consequent imposition of import restrictions, prevents much American model merchandise from reaching Israel and, of an estimated 100 glow plug motors, mostly McCoy's, in that country, many are grounded for want of minor parts, especially plugs. The result is that the Diesel is preferred at the present time. Constituents for Diesel fuels, too, are much easier to obtain than those for glow fuel.

There are no model stores in Israel and, for the most part, successful model builders are dependent on foreign friends for manufactured items, while such balsa as is at present available is cut from old life rafts. However, the hobby is receiving official help from the Aero Club of Israel through its Aeromodeling Section and, recently, a shipment of 65 German Webra motors (15 Piccolos, 35 Rekords and 15 Winners, but no Mach-1's) with spares, was imported by the Ae.C.I. for distribution to members. The possibility of producing a suitable motor in Israel had been considered, but the project was abandoned, we are told, because of the high cost resulting from limited demand.

Mr. Naftali Kadmon, Chairman of the Ae.C.I. Aeromodeling Section, tells us that most primary modeling is done by groups (rather on a youth movement basis). Young beginners build three standard glider models with the help of instructors, before continuing on their own. Instructors are mostly boys of 16-18 years with modeling experience, who attend special vacation camps.

Norway

During 1955, Jan David-Andersen exported over 200 of his well made Deisels to the United States. The .15 cu. in. D-A Diesel is now in its fifth year of production and we have no doubt that most of the original jobs are still around, for this is a really rugged job, made to last. Both this and the .06 model are now being put out with an improved venturi which gives an even carburetion through maneuvers and *(Continued on page 40)*



A real achievement in porting design enabled Bill Atwood to make the reduction in engine height.

Engine Review

By E. C. MARTIN

More potent and compact that even earlier Atwood .049's is the Shriek—which is well named!

At one time the petroleum derivative with the highest known anti-knock property was iso-octane and it therefore became the standard for the comparison of fuels. All other internal combustion engine fuels were rated as so much per cent octane, according to their relative anti-knock property. For some time it has been one of our happy little practices mentally to rate new engines in a similar manner as being so much per cent in over-all merit of what we feel was an example of the pinnacle of all-around excellence reached by the model engine industry. This paragon of virtue was, in our opinion, the ball bearing Arden .099 and most people will agree that few other engines have ever approached its standard. However, there are other standards of comparison and when one thinks in terms of over-all engine height and its reduction, the laurels unquestionably belong to Bill Atwood for the great ingenuity displayed in his original Wasp .049. The subject of our test this month is the latest progeny of the Wasp, the Atwood Shriek.

Outwardly, the Shriek closely resembles the old Wasp and the later .049 and .051 models, so that the details that make the difference are inside and not immediately obvious. However it is easy to identify the new engine from the change to an integral head and plug and, when you run it, from the noise and extra steam undoubtedly responsible for its name.

Unlike the practice with the last Atwoods, the Shriek crankcase passes through the tumbling barrel before machining and consequently has a high polish to match the radial tank mounting assembly. One of the very pleasing features of this casting is that its nicely shaped exterior is duplicated almost exactly by the interior which in turn is in almost perfect conformity with the probable gas flow. The result is a casting of substantially uniform thickness throughout and, owing to the progressive increase in over-all diameter from front to back where the strain of mounting occurs, of almost uniform stress. It is therefore a crankcase design which, from every point of view, would be hard to improve upon, and the years between the Wasp and Shriek have apparently given Bill Atwood no cause or ideas for doing so.

From the close similarity of many other later engines, other designers also seem to regard this shape as the answer. However, Bill seems to have a compulsion about over-all height because he keeps doing the apparently impossible and knocking a few thousandths off with every new model. The way in which he manages it in the Shriek is especially interesting. He starts with a clean sheet of paper headed: "Two-Stroke Cycle Valve Timing-Radial Porting" and systematically reduces greatly any of the advantages opposed porting has over radial porting along the way.

His train of thought probably took this direction. Since true 360° radial porting inevitably places the exhaust and bypass ports one on top of the other and requires a thin length of bore to maintain a seal between them, the piston has to travel quite a long way down beyond the point of exhaust port opening and combustion pressure (*Continued on page* 44)

MAN at Work

(*Continued from page 6*)

sides Exchange, I've worked with Chambers of Commerce, Boy's Clubs, etc. The one impression I've come away with is that the kids want to get into modeling but they get little encouragement at home or any real support from the groups sponsoring the program."

May we qualify that for you, John? We do have some (but all too few) father-son combinations and some people who pitch in. Maybe, incidentally, we should offer rewards for father-son events.

• • •

► Interested in home-built aircraft? A. Lee Spencer, Editor and Publisher, the Amateur Aircraft Builders, has a newsletter that is crammed with accounts, sketches, drawings . . . 28 members of Southern New Jersey Associated Modelers attended Bucks County (Pa.) Federation Banquet last February. The Jerseyites challenged the Pennsylvania boys to a wing-ding this summer . . . A derrick attached to a helium-filled balloon was thunk up by Max Ripken to suspend his indoor model from the rafters during the January 15 indoor meet, Aerocraftsmen Gas Model Club, in the Fifth Regiment Armory, Baltimore. Forty-Nine entrants had at it, in paper-covered stick, stick, HL glider and Jig-Time kits (the latter as reported in MAN for October, 1955). Stick model belonging to Tony D'Allisandro flew through a 1 ft. gap in muslin curtains used to hide the girders. First out of sight in indoors.

Where do you get Pirelli rubber? Our boy Ed Dolby has the stuff in hanks and in machine-cut 6 ft. lengths for indoor sizes. That's the New England Wakefield Supply, 25 Exchange St., Rockland, Mass. Also has ball bearing washers, Swedish steel music wire and complete front end assemblies for Wakefields. If you've ever bent up one of these things, you'll know what this means! . . . Two bits will bring you the new 64-page America's Hobby Center catalogue with a free ownership decal good for a name plate on models, tools, etc. Over 10,000 items listed . . . $30 round trip bus fare from Minneapolis to the Dallas Nationals is in the cards if enough upper Midwest gentry contact Mark Jones, 5529 Concord Ave., Minneapolis 10, Minn. Adults along to keep you young fellows in line—reassure Maw and Paw . . . Club paper name that now heads our Hit Parade: The Ravin Cajuns of New Orleans. This club has full insurance protection for members . . . An indoor U-control meet for Half-A and A Speed was held February 26 inside the Ohio National Guard hangar, Akron-Canton Airport. Also, a Class A scale special event and a Half-A hassle for kids under 16. Expected high times didn't come off. At 72° indoors, the fuel mixtures were wrong. Akron Council of Model Builders thought up this one.

Orchids to Cleveland Model Co. for their SF series of kits from Ellic Somer, Fresno, Calif., who tells of kids building all sorts of stuff with a little help and encouragement. Like a Comet Pepper (90-second flight), Pacific Aces and Gollywocks—one of these even had a folder. Not a whole prefab in the bunch. All they got was a set of plans and some blank wood not even printed. Why don't a few thousand of you younger readers write the manufacturers and insist you are neither lazy nor stupid? Unfortunately, while there are notable exceptions, too many dealers and middlemen deny you the chance even to see many of these things. Thanks, you guys, for asking dealers about Gollywocks

(*Continued on page 38*)

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2 BRAND NEW SPEEDBOATS!

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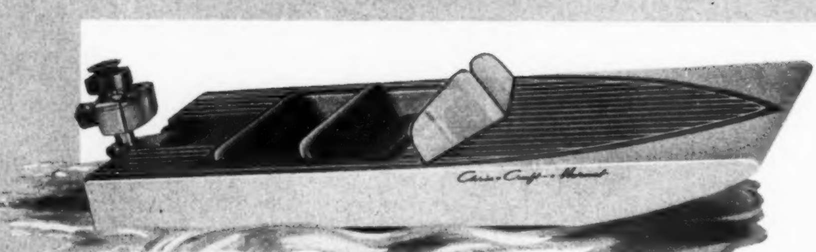

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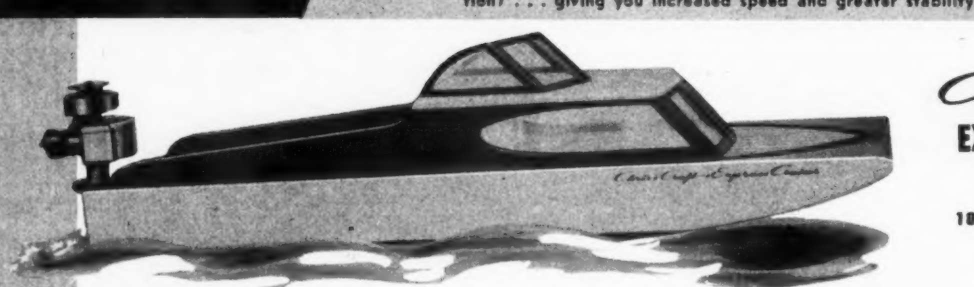
* These new speedboat models feature a new concept ("Waterama" Design) high-powered performance. Note how the bow lifts out of water (reducing friction) . . . giving you increased speed and greater stability!



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Our extremely popular scale model of the AT6 Trainer. Carved balsa fuselage, etc.

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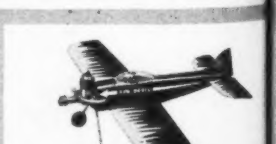

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Terrifically colorful all around sport flyer. Practically puts itself together. Prefabbed

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(and all the other things we've mentioned). Dealers are reading Alice in Wonderland looking for the Gollywock . . . Crescent City Prop Busters, formed in New Orleans. Write to 2711 Biebville St. . . . Belleville Flying Dutchmen, Belleville, Ill. (Richard Valentine, 1011 W. Main) added second 220 ft. circle, Carrier deck, too, and surfaced for most delicate scale jobs. Five year lease on circles, parking areas, access roads, Swansea Park, five miles out . . . Bucks County Federation of Model Clubs (this from several sources) state no connection with any sectional paper. Glenside Air Scout Group now has own paper called GASbag. This group and Hatboro Aeromodeleers joined; GASbag approached to include all BCMAC groups on its roster. Group plans two-day RC session for May 5.

February 5 saw 500 people out on the thick ice at Green Bay, Wis. Not fishing but watching models. Second Winter Jamboree yet. All free flight event, towline glider, RC rudder-only. Winter thermals exist? Several six-minute maximums. (R. L. Cowles, 224 Oakhill Drive, Green Bay, Wis.) . . . Brooklyn Sky Scrapers, one of the oldest clubs in the land, again active. Contact Bill Dunwoody, 457 73rd St., Brooklyn 9, N.Y. Meet first and third Friday nights . . . July 7 and 8, dates for Flying Bison RC get-together (Vern Krehbiel, Arondale Rd., Williamsville, N.Y.) . . . International Competition Week-End, May 26-27, local eliminations: Ed Dolby, 25 Exchange St., Rockland, Mass. Can't run 'em all, Ed; you're elected! . . . Biggest meet yet in North Florida, June 23-24, at Tamoka Field, 12 miles north of Daytona Beach. Unused Navy field, now for cattle grazing and model chasing. Paved 4,500 runways, open country. Charles Faraldo, 627 Magnolia Ave., Daytona Beach . . . End of the Line.

Gastove

(Continued from page 20)

I realized that one of my larger sized models fitted with a 2.5 cc Diesel would be much more suitable for FAI work but, owing to my yearly exams, I was unable to finish the first one of a pair until late in 1953. This model, MK-13, was fitted with an ED 2.46 and was my first model to be a consistent winner in contests. MK-13 is just being patched up for yet another contest season. A Fox .29, installed at the end of 1954, gives a rather faster climb.

Construction

Anyone capable of building a model of this type will only need a few short notes dealing with some of the unusual construction methods used. I must stress that it is absolutely essential to select wood with the greatest care if the model is to be both light enough and strong enough for contest flying.

Fuselage

I have not drawn out all the fuselage formers since the process of drawing, tracing and then cutting out the shapes can't be carried out with anything like the accuracy required to produce smooth faired lines for planking. This is particularly true where the section changes only slowly along the fuselage boom and these formers must therefore be worked by a different method. If my seemingly rather crude method is followed, it will be found to be quite easy.

Build the crutch flat on the plan, using matched longerons. All spacers should be pre-cemented for added strength. Having sanded the crutch, the ply former F.3 and the bearers should be added, the bearers being drilled and spaced to fit your choice of motor. Lay the crutch flat on the plan with the front former (F.3) over the edge of the bench and add the top halves of F.4, 5, 6 and 16, fitting the 1/16 in. sheet pylon outline in place. The top stringer can now be cemented to the 1/16 in. sheet and to F.16. Cut pieces of soft sheet roughly to the shape of the formers but with the correct slot position for the stringers and cement in place. Remove from the plan and repeat for the lower half of the framework.

The formers can now be trimmed nearer to the required form by first cutting with a razor blade followed by sanding. It is quite easy to shape them so that by looking along the fuselage from eitner end, the formers present a slowly changing profile with no bumps or hollows. This smoothing process may be aided by laying pieces of 1/16 in. sq. along the formers and noting any sudden changes in curvature. I must stress that the fairing of the formers must be very good if, after only light sanding to about 3/64 in. thickness, the planking is to present a surface good enough for adding a highly polished cellulose finish. The soft hollowed-out front pylon block should now be added to F.3. It must be sanded so that it fairs in well with the other pylon formers.

Pick two even sheets of 1/16 in., weighing about 1 oz. each, and sand lightly on both sides. The fuselage is planked, using strips of 3/16 in. width; a cement which shrinks only slightly should be used to prevent distortion on hardening out. The planking should be allowed to set for at least two or three weeks before sanding and filling with sealer, for it is necessary to make quite sure that no more shrinking of the cement is likely to take place. I cover my fuselages with a single piece of silk, which is coated with sanding sealer or dope followed by four or five coats of cellulose finish. A further period of two to three weeks should be allowed for the finish to set hard before rubbing down and polishing.

Wing

This is of fairly conventional design except, perhaps, for the hollow LE. Be careful to select matched spars from good quality, straight-grained, fairly hard balsa. As a guide to wood selection, the weight of the wing, ready for covering, should be about 1¾ oz., giving a final weight of 2¾ oz. The best way of building up the curved LE's at the tips is to cut the upper 3/8 to 3/32 in. and the lower strip of ¼ x 1/16 in. into thin planking strips which can be bent and cemented in place one by one quite easily. Every joint in the wing structure should be coated with an additional layer of cement for added strength. The wing structure should be well sanded before covering with lightweight Modelspan (Silkspan in the U.S.) or Japanese tissue.

I give my flying surfaces three coats of glider dope followed by two coats of thin dope-banana oil mixture. Before use, the flying surfaces should be allowed to mature and set quite firmly. This may take anywhere from six months to a year, but the delay is necessary if the model is to hold its trim.

Fin

The ribs on the fin are sanded by eye to a smooth, streamlined shape before covering with soft 1/16 in. sheet. The sheeting is treated like the fuselage planking, being covered with silk or tissue, followed by sanding sealer and colored cellulose. Take care to use only thin coats of color to try and keep the weight to a minimum. The finished tailplane and fin should weigh about 1¾ oz.

Trimming

I trim my models to have a tight vertical right-handed spiral climb, rolling slowly about the fuselage followed by a wide right glide. I use a relatively slow motor driving a 9/5 airscrew, which produces a fairly large torque reaction giving most of my left-hand rolling moment. The swirl behind the propeller is also considerably larger than that behind, say, an 8/3¾; this also reduces the rolling moments if a high-speed glow plug motor is used and I therefore suggest that in this case the more normal 60° right-hand spiral be adopted.

The glide turn is adjusted by using the now conventional tail tilt. However, about ¼ in. opposite trim tab is required to re-straighten out the climb. The angle of climb can be adjusted by slightly altering the tail angle, the glide being trimmed by moving the CG.

Using short runs of five or six seconds of medium power, the model should be adjusted to have a normal spiral climb, or, putting on full power, the model should start to climb vertically.

Please always use a dethermalizer, even for the very first flights, for after quite a lot of hard work, it is infuriating to have a flyaway after one or two test flights: This happened to me once so I now *always* use a DT—every flight!

The second model of the pair was fitted with an Oliver Tiger, the added power making it a much better contest model than the ED 2.46 version. This model is still in quite good condition and will be used as my second reserve FAI this year.

During the winter of 1953, I went quite mad and built two more models, but this time down to 400 sq. in wing area and thus back to my original dimensions, as in 1949. It was with MK-16, the Oliver Tiger version, that I won the World Championship in Germany. The ED 2.46 model (MK-15) was my reserve.

The improvements to my models through the years have been mainly structural with only small changes in airfoil shape and CG position. My latest modification in-

corporated in MK-16 is a thick, built-up anti-warp fin, an idea adapted from Pete Buskell.

The contest times recorded by this series of models are shown below for the last two years. All contests were flown with 15 second motor run and with either three flights of four minutes maximum or with five of three-minutes (asterisk).

1954

Model	Motor	Flight Time
13	ED 2.46	8:41
15	ED 2.46	11:44
15	ED 2.46	11:05
15	ED 2.46	13:27*

Max. Possible	Contest
12 mins.	7th Team Trials
12 mins.	2nd Frog Sr. Trophy
12 mins.	1st Croydon Gala
15 mins.	1st London Area Eliminator & 4th Halifax Trophy.

1955

Model	Motor	Flight Time
14	Oliver Tiger	13:38*
14/15	ED/Oliver	14:13*
13	Fox .29	10:37
13	Fox .29	10:42
16	Oliver Tiger	15:0*+5:13
15/16	ED/Oliver	14:35*

Max. Possible	Contest
15 mins.	6th Astral Trophy
15 mins.	3rd Team Trials
12 mins.	2nd Croydon Gala
12 mins.	2nd Scottish Gala
15 mins.	1st World Championships
15 mins.	5th London Area Eliminator

Between them, MK-15 and MK-16 have scored 65:51 out of a possible 69 minutes in 21 flights; this gives an average duration of 3:11 out of a possible maximum of 3:26.

Foreign Notes

(*Continued from page* 33)

should be welcomed by stunt RC men. Another pleasing David-Andersen feature is the full size three-view installation drawing that comes with each motor. It is on translucent paper, so that it can be laid over model plans to facilitate the working out of installation details.

Cuba

Down in Cuba they have thermals in January and no "closed season" for model flying. One of the last winter contests was an all-scale controlline meet which drew quite an assortment, ranging from a WW I SE-5 to the Eglington Dyna-jet-Cougar featured in our March column. Winner was airline pilot Emilio Salazar, flying a nine-year-old J.3 Cub with spark-ignition Super-Cyclone. Other entries included a Fleet Trainer, also Cyke powered, a Sterling Ryan S.T. (remember this pre-war favorite?) and a Beech Twin-Bonanza.

Europe

It seems that the views we expressed anent FAI's startling rule changes are widely shared. One British magazine closely fills three pages with letters from nine countries on the subject. Fourteen correspondents were against the new rules; only two in favor. At this writing the new rules still stand but Britain's SMAE has proposed an early meeting of the FAI Model Commission and a decision, one way or the other, should be known soon after these words appear in print.

Western Germany

Latest item from the German Johannes Graupner concern is Tippy *selbstbaufernsteurung:* i.e., "self-built remote steering" or, simply, kitted RC. Tippy receiver design resembles that of the already established Graupner Standard receiver, except that the relay is separate from the receiver chassis. Booklet supplied is particularly well turned out and is profusely illustrated.

Attention, Collectors . . .

John (World Engines) Maloney gives an interesting sidelight on the imported engine buyer. Seems that the notion that used engines have no final resting place but the junk yard is now an outmoded idea. Just as the automobile world has its collectors of veteran, classic and foreign cars, so we are finding more and more modelers making a hobby or collecting interesting and unusual engines, particularly foreign jobs and early domestic productions. Demand for the latter is actually outstripping the supply.

Strip Your Own Rubber

(*Continued from page* 17)

to size from ¼ in. sheet. All needed are: one piece 3 x 6 in.; two pieces 1½ x 6 in. Other materials necessary are two 3-48 x ⅛ in. screws; several washers; a single-edged razor blade; a scrap of balsa; a small tube of plastic cement.

While all the edges should be sanded smooth, particular attention should be given to see that the back edge of the base is straight, so that when the back piece is cemented on, it will be perpendicular to the base. The 3/32-in. dia. holes can be drilled in the locations noted either before or after the back piece has been cemented to the base and the bottom part of the base hole should be drilled out with a ¼ in. drill and a nut cemented in the countersunk part so that nothing will be protruding from the bottom of the base. The slot in the adjustable guide can be made by drilling several 3/32 in. holes in a row close together and cutting away

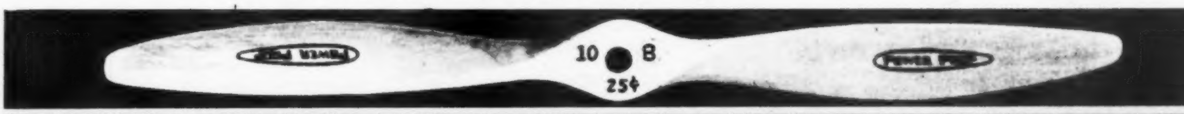
(*Continued on page* 42)

here are the WINNERS!

1955 NATIONALS
Los Alamitos, Cal.

Again, for the fourth time, Top Flites and Power Props won _more_ events in the Nationals _than all the other makes combined_. Fly with a sure winner!

A pair of Top Flite winners from Yuba City, Calif. GARY GRENOBLE (left) beat the best in ½A F.F. JR with his Shorty. Swung a 6-3 POWER PROP on his Atwood .049 with Ohlsson Gold Seal go-juice. Time, 16:34. DAVID ARNE bagged first in A F.F. JR with an Ohlsson Gold Seal 2000 bang-watered Cub .09. His Jasco Rival clocked 14:00 behind a 7-4 TOP FLITE to make him Junior National Champ!



½ A SPEED JUNIOR
Michael Obryan
Detroit, Mich.
Speed 73.95mph
Engine Thermal Hopper
Fuel Home Brew
PROP 4½-7 POWER PROP
Plane Original

A GAS F.F. OPEN
John D. Nagy
Denver, Colo.
Time 18:00
Engine Atwood .051
Fuel K&B 1000
PROP 6-3 POWER PROP
Plane Jasco Streak

C GAS F.F. JUNIOR
Jack Linn
Los Angeles, Calif.
Time 16:36.0
Engine Torp 32
Fuel Ohlsson 200
PROP 10-6 POWER PROP
Plane Modified Zeek

PAA-LOAD OPEN
L. T. Everett
Long Beach, Calif.
Time 14:25.2
Engine Thermal Hopper
Fuel Thimble Drome Racing
PROP 6-3 POWER PROP
Plane Payee

INT'L PAA LOAD JR-SR
Robert Putchin
Hawthorne, Calif.
Time 11:42.3
Engine Torp 15
Fuel Thimble Drome Racing
PROP 8-3½ TOP FLITE
Plane PAA-Sir

STUNT OPEN
Bob Palmer
Burbank, Calif
362 points
Engine Veco 35
Fuel Exothermic 28
PROP 10-6 TOP FLITE
Plane Thunderbird

FLYING SCALE SENIOR
Jim McCroskey
Iredell, Texas
294 points
Torp 29 engine
Fuel Fox
PROP 9-5 TOP FLITE
Plane F-51

B GAS F.F. JUNIOR
Bob Johnson
Riverside, Calif.
Time 14:07.8
Engine Fox 29
Fuel K&B 1000
PROP 10-6 TOP FLITE
Plane Modified Spacer

PAA-LOAD ENDURANCE
Richard Heist
Fort Worth, Texas
Time 1 hr. 8 min. 14.6 sec.
Engine Torp 15
Fuel Powermist
PROP 8-6 POWER PROP
Plane So-Long-Gone

½ A SPEED SENIOR
Mike Dawson
Galesburg, Ill.
Speed 79.29 mph
Engine Thermal Hopper
Fuel Thimble Drome Racing
PROP 4½-6 POWER PROP
Plane modified Whirlaway

FLYING SCALE OPEN
Thomas Dean
Corpus Christi, Texas
344 points
Engine Cameron 19
Fuel K&B 1000
PROP 9-6 TOP FLITE
Plane Aeronca Crop Duster

B GAS F.F. SENIOR
Bob Gelvin
Topeka, Kansas
Time 16:56
Engine Torp 23
Fuel K&B 1000
PROP 10-3½ TOP FLITE
Plane Spacer

FLYING SCALE F.F. JR-SR
Robert Gelvin
Topeka, Kansas
85 points
Engine Wasp .049
Fuel K&B 1000
PROP 6-3 POWER PROP
Plane Longster "Wimpy"

COMBAT JUNIOR
Michael Burke
Louisville, Ky.
520 points
Engine K&B 35
Fuel Exothermic 28
PROP 10-6 POWER PROP
Plane mod Trixter Profile

NAVY CARRIER SENIOR
Clyde Hamilton
Bellflower, Calif.
377.47 points
Engine Torp 35
Fuel K&B 1000
PROP 9-6 POWER PROP
Plane Grumman Guardian

C GAS F.F. SENIOR
Don Geisler
Monterey Pk., Calif.
Time 27:26.0
Engine Torp 32
Fuel K&B 1000
PROP 10-6 TOP FLITE
Plane Civy Bdy 61

FLYING SCALE F.F. OPEN
Bob Hill
Capistrano Beach, Calif.
213 points
Engine Atwood .049
Fuel K&B 1000
PROP 6-3 TOP FLITE
Plane Berkeley Sup. Cruiser

COMBAT SENIOR
Jim Leverett
Glendale, Calif.
560 points
Engine Fox 35
Fuel V&O
PROP 9-8 POWER PROP
Plane Original

NAVY CARRIER OPEN
R. M. Post
Fresno, Calif.
391.93 points
Engine McCoy 29
Fuel Powermist
PROP 9-7 TOP FLITE
Plane Grumman Guardian

R.O.W. GAS JUNIOR
Jack Moreland
Long Beach, Calif.
Time 12:31
Engine Space Bug .049
Fuel Thimble Drome Racing
PROP 6-3 POWER PROP
Plane Orig. by J. Osley

RADIO CONTROL (rudder)
Edward L. Friend
Las Cruces, N. M.
76⅓ points
Engine Fox 25
Fuel Olhsson 200
PROP 11-4 TOP FLITE
Plane Live Wire Crusier

COMBAT OPEN
Donald R. Smith
San Bernardino, Calif.
540 points
Engine Fox 35
Fuel K&B 1000
PROP 10-6 POWER PROP
Plane ½ Fast

½ A GAS F.F. SENIOR
Don Alberts
Albuquerque, N. M.
Time 36:00
Engine Atwood .049
Fuel Thimble Drome Racing
PROP 5¼-4 POWER PROP
Plane Privy Boy

R.O.W. GAS SENIOR
Jack Thomas
Garden Grove, Calif.
Time 12:58
Engine Torp 15
Fuel Home Brew
PROP 10-6 TOP FLITE
Plane Modified Spacer

RADIO CONTROL (multi)
Alex Schneider
San Francisco, Calif.
156⅔ points
Engine Spitfire 60
Fuel Gas & Oil
PROP 14-6 TOP FLITE
Plane Modified Piper Cub

FLYING SCALE JUNIOR
Gary A. Cummings
Fort Worth, Texas
183 points
Engine 2 Torp 32's
Fuel Cheminol #2
PROP 10-6 TOP FLITE
Plane B-26

NEW RECORD ½A SPEED
Jerry McClung
Abilene, Texas
Speed 79.24 mph
Engine Thermal Hopper
Fuel Thimble Drome Racing
PROP 4½-6 POWER PROP
Plane Mini-Whirlaway

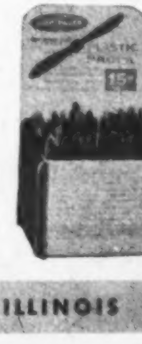
HELICOPTER
Parnell Schoenky
Kirkwood, Mo.
213.79 points
Eng. Atw'd .049 & Jetex 350
Fuel Cheminol AA
PROP 6-3 POWER PROP
Plane XH-4 and JH-5

NEW! TOP FLITE PLASTIC PROPS
for _most_ pull from ½A engines

4 SIZES: 5¼-3, 5¼-4, 6-3, 6-4

15c EACH

Molded of break-resistant, mar-proof and fuel-proof plastic to give longer life, more flights and easier starting of ½A engines. Over a year of pre-market testing to insure that these new plastic props meet TOP FLITE'S high standards of precise engineering for higher performance . . . the "tops in props."



TOP FLITE

TOP FLITE MODELS, INC. • 2639 SOUTH WABASH AVE. • CHICAGO 16, ILLINOIS

the remaining edges with a sharp-pointed knife or razor blade. The inside edge of the adjustable guide should be sanded real smooth with a piece of 600 wet or dry finishing paper.

In assembling the stripper, washers should be used under the heads of both screws so that they will hold more securely. After the rubber stripper has been assembled, all widths of rubber can be cut in this way: (1) Loosen the adjustable guide, lay the rubber flat along the base under the blade, press the adjustable guide snugly against the rubber and tighten screw; (2) Remove or add enough washers behind the razor blade so that it will cut the rubber approximately in half. Tighten the screw and press the tip of the razor blade through the rubber; (3) Cut a balsa wedge the same width as the rubber being cut and shove it under the blade so that it holds the rubber firmly to the base of the stripper, especially at the point where the blade cuts the rubber. This and a good sharp razor blade are the two most important requirements in stripping rubber. Be sure to use a good brand of razor, such as Gem, for this seems to remain sharper, holding its edge better, than a cheaper brand; (4) The stripper should be clamped or fastened to a table or bench so that the rubber can be pulled through at a steady rate, which I have found to be about 6 ft. per minute. As soon as you have started pulling through the rubber, move about 3 ft. from the stripper to allow the rubber to stretch to a point where continued pulling will have little or no effect on the tension and width of the rubber as it is being cut.

Rubber can be cut best when it is divided nearly in half but a one-third: two-thirds split isn't impossible with the use of a good sharp blade. Just be sure that both parts of the rubber are grasped firmly as you pull. Obviously, if you cut 3/16 or ¼ in. rubber nearly in half and then split each of these strips the same way, you will find yourself with quite an assortment of sizes.

Travel Air 2000

(*Continued from page 10*)

fuselage sides from 3/32 in. sheet balsa. Cement bulkheads 4, 6, 7 and 8 between the sides, square up the assembly and allow to dry well. The 5/16 x ⅜ in. motor mounts and the ⅛ in. plywood bellcrank mount can be installed. Since bulkheads No.'s 3 and 5 interlock somewhat with the fuel tank, they should be installed together. Finally, join the sides at the tail and add bulkheads No.'s 9 and 10.

Bend the 1/16 in. wire cabane struts and the 1/16 in. wire landing gear parts to shape. Use thread to sew the cabane struts to No.'s 4 and 6 bulkheads. Cement the thread liberally and bind and solder the strut ends. Sew the landing gear to bulkhead No. 6. Also sew the proper struts to the ⅛ in. plywood landing gear support and set it aside.

Cement the 3/32 in. sheet stringers to the fuselage sides. Install the bellcrank, pushrod and leadouts and cement the lower wing into place. Now can be added the balsa side filler pieces at bulkhead No. 3 and around the leadout wires and the lower wing. The plywood landing gear support can be installed, the gear bound and soldered up and the fuselage bottom can be sheet covered from bulkhead No. 3 to the wing joiner. Plank the fuselage top from No. 4 to No. 6 bulkhead and add the stringers over formers No.'s 8 to 10. Bind the tailskid to the 3/32 in. plywood support and cement in place. When the nose blocks and strut fairings have been installed, the entire fuselage may be sanded smooth and covered with silk.

We can cement the stabilizer, fairing block and fin to the fuselage. Make the plywood interplane struts, aileron struts and vibration dampeners. All parts, including the covered side of the upper wing, should be finish-doped in preparation for final assembly. Install the windshields and cockpit coamings at this time.

This brings us to installation of the top wing. Cement the interplane struts into the sockets or rib D. Before these dry, slide the upper wing into place and cement the struts into the sockets at rib C. Holes will have had to be cut in the covering to allow the cabane strut ends to pass through. If care was used in locating ribs C and D in the wing panels, the wings will be pretty well lined up. Do not fail to double-check this before the cement dries. When these joints are dry, bind and solder the cabane strut ends to the attachment wires in the center section of the top wing. This strut arrangement is virtually indestructible, the stresses being carried by all the ribs in the center section. Also, extremely accurate building ability is not required, for the wire struts are flexible and will bend to accommodate small errors.

Drill 1/32 in. holes in the rigging wire locators. Use the cut-and-try method to fit the 1/32 in. rigging wires in place. Once in place, they must be removed, be thrust through the drilled holes in the vibration dampeners and then replaced as an assembly. Solder a washer to the ends of each wire inside the wings. The wires will probably rattle slightly but this can be stopped by cementing liberally around each washer. The bottom sheet covering at the lower wing roots can be added now. We can then cover and finish-dope the bare sides of both wings. There is a little extra work involved in this method of installing rigging, but although this ship may cartwheel many times, the rigging will not pull out or sag as do so many other types employed by model builders.

Push the 1/16 in. wire axle through the tubing on the elevator and stabilizer. Crimp the two end tubes to retain the axle. The rudder and celluloid inspection windows can be added. Don't forget the line guides or aileron struts. Use Trimfilm for the license numbers and blackened sandpaper for the wingwalks.

The drawings of the radiator and shock absorber detail are largely self-explanatory. If you elect to build the exhaust stacks of soldered pieces of tubing, I earnestly recommend that you build a jig which will enable you to solder the parts together accurately.

Once again I've used those beautiful disc-type Scalemaster wheels for that true scale effect. Simulate the brass prop blade LE's with Aero Gloss gold for an added touch. The model was covered with silk and had about 15 coats of Aero Gloss clear and colored dopes hand-rubbed to a beautiful finish. The color scheme was: *Navy Blue*—fuselage, fin, rudder, struts, vibration dampeners; *Silver*—wings, elevators, stabilizer, wheel discs; *Black*—wing license numbers; *White*—rudder license numbers.

My Travel Air balance 1¾ in. aft of the top wing LE without adding any ballast. It flew fairly fast without pitching or yawing.

The super-detail fan may look up Joe Nieto's fine drawings (2/53 *issue out of stock—Editor*) and pile it on to his heart's content. But for the hotrock, I sincerely believe that a general lightening of the ship will produce a fine stunt model. Either way you slice it, it's mighty fine fare.

The MAN .19

(*Continued from page* 26)

10-32 steel screw with a music wire tommy bar soldered in the slot and can be made to any desired length over ⅛ in.

Backplate

Chuck the piece of dural 1⅛ in. dia. x 2 in. long in the three-jaw so that is projects 1 in. from jaws and face off. Center drill, drill and ream ⅜ in. dia. using kerosine or fuel oil as lubricant. Lightly scribe center lines with tool point and, while it is still in lathe, mark out with steel rule and scriber to locate intake center. Make heavy center pop mark at this point.

Using highest spindle speed and finest cross feed with sharp round nosed tool and well lubricated light cut, reface end, taking care not to eradicate center pop.

Clamp scriber in tool post and lightly mark out intake segment to drawing, using divided headstock, or chuck jaws and protractor as guide.

Turn OD down to snug slip fit in crankcase for a length of 7/32 in. and face shoulder to good finish. Cut off 29/32 in. long with well lubricated cut-off tool, having plenty of top and side clearance.

Drill and ream intake hole on center pop mark.

Taking great care not to damage the finished valve face, saw away the bulk of excess material around the intake.

Turn up mandrel for intake bore and set-up back outward. Turn and face back to drawing.

Mark out bolt hole centers and lugs to drawing and saw and file to match crankcase.

Carefully file intake segment to achieve smooth blending with intake bore.

Drill hole to suit spraybar unit at desired angle. (Cameron .09 unit, ⅛ in drill, used on prototype with fiber washers.)

Valve Disc

Set up piece of 1 in. dia. dural remaining from prop driver in three-jaw. Center drill, drill and ream ⅜ in. dia. and face. Turn OD to drawing and mark out, using tool and headstock, for valve opening and drive recess center. Cut off to drawing thickness plus 1/64 in.

Saw and file balance step and valve opening; drill and flat bottom drive recess.

Turn up mandrel for center hole and, using very light cuts, face in similar manner to backplate, down to drawing size.

Reverse on mandrel and bore recess for valve pin head.

Valve Pin

Turn from 3/16 in. drill rod to press fit in backplate, striving for best possible finish on small diameter. If necessary, lap valve disc to running fit on pin. An early McCoy .19 valve pin can be used if desired.

Assembly

This operation will be self-evident by the time you have completed the components; however, thoroughly clean and oil everything before finally putting unit together.

The valve unit can be improved by fitting a McCoy .19 rotor shim and, with or without, the pin should be pressed in until the disc revolves with a slight stiffness.

No backplate gasket should be necessary, but a .005 in. gasket of fiber or soft copper should be fitted at the lower cylinder flange joint.

You will find minor differences between the illustrations and the working drawings, made to simplify construction.

The final installment of this article next month will describe break-in and the alternative reed valve and carb unit and a glow conversion.

Engine Review

(*Continued from page 34*)

release before a decent bypass port opening is achieved. The unfortunate thing is that, although the exhaust is open all this time, it is still a very narrow port and, although longer circumferentially than on the opposed port engine, enjoys only about half the width. Therefore it would be extremely crafty to eliminate the need for the piston to go down so far below the exhaust so that, for the same effective piston stroke, the port could be made wider or, alternatively, the effective stroke could be made longer for the same port area and more urge could be extracted from the expanding gases before they escaped, the choice being easily made by practical results.

So far, this is standard model engine designer thought ritual and usually finishes at this point with a forlorn sigh and time out for a cup of coffee. However, Bill has broken the ritual and substituted for the sigh and the coffee an adaptation of Ray Arden's annular bypass groove to to his own improved external port system. It will be remembered that the earlier Atwood engines had three exhaust ports atop three bypass ports of similar dimensions and the pairs of ports were separated by the small but vital triangles of metal necessary to keep the cylinder cooperating with the rest of the engine. The two sets of respective ports were separated by a length of bore governed by the cylinder joint flange thickness which, being a part of the cylinder subjected to the stresses of a vibration proof friction fit, had to be of adequate proportions to resist distortion to both itself and the cylinder bore. The land separating the exhaust and bypass ports was therefore governed by the courage or recklessness of the designer in choosing the minimum dimension he thought he could get away with.

Obviously, if the bore distorts, the hottest porting in the world will not make a good engine. We therefore have a situation in the common flanged radial ported cylinder where practically the whole engine design is governed to some degree by the thickness of the joint flange and many ideas have been tried to get around this limitation such as internal bypass grooves with their attendant bore honing problems, holes drilled at an angle between the exhaust ports, as in the Brebeck system, with consequent reduction in the possible size of both ports, and the myriad of intermingling drilled holes used on the English Yulon engines. All of these compromises, for that is all they are, suffer some serious handicap in efficiency or ease of manufacture. Up to now the best example of radial porting was the first: namely, that found in the Arden engines where two annular grooves were cut in the bore, the upper for exhaust and the lower for transfer. The usual three milled slots connected the exhaust to atmosphere and a large number of grooves broached in the bore connected the lower to the crankcase, thus providing complete 360° porting and one of the trickiest examples of production engineering you could find.

Understandably every other manufacturer has kept clear of broached grooves and instead persevered with an external system, or settled for two or three milled grooves without the annular groove at the top. The thing Bill Atwood has done is to combine successfully for the first time the advantages of both the annular groove and the external bypass with a flanged joint and, by undercutting the quite robust flange with the annular groove, he has reduced the land separating the ports to what he feels is the minimum sufficient to provide a seal. Having thus brought his ports close together and made the bypass the largest circumferentially possible, he has been able to reduce its depth in terms of piston stroke and therefore reduce the amount of the cycle that is taken up with the business of breathing.

The crankshaft of the Shriek is fully counterbalanced and has a very large chamfered gas passage. With the waisted mainshaft and neat prop driver splines, it has a very elaborate appearance in comparison with the original Wasp shaft. The piston, conrod, prop driver and spraybar assembly remain the same as on the earlier models, but the fuel tank now has a press fitted backplate which is leakproof and reduces the jumble of bits and pieces one had hitherto to feed onto the radial mounting bolts.

The big change for most people on the Shriek will be the combined head and plug, necessitating a new head in the event of element failure *(as with the Cox engines – Editor)*, and to those users and dealers who consider this an unwarrantable bind, it is well to reflect that it is not only the price of extra performance, but also in a sense a guarantee of extra steam because it is now impossible to fit the wrong heat range plug or mess up the compression ratio by using the wrong thickness of plug gasket or plug reach. Also, since the element is matched to the engine, it can therefore be expected to be highly dependable. However, it is the exposed type of filament which runs hot and it will not take kindly to the 2V-plus of a storage battery for starting without a suitable resistance in series. When replacing a head, great care should be taken to see that the asbestos gasket is in good condition and that the Atwood wrench is used, as the wrench flats milled in the head are of minimum dimensions and designed to collapse under excessive torque.

Performance and Handling

The needle setting requires delicacy in handling as the spring frictioning device tends to turn the needle slightly in reverse upon removal of the fingers and also tends to recentralize the needle, should any side load be exerted during adjustment. The result is that, when tuning really finely at high speeds, it is not uncommon for the revs to drop when you let go of the needle. However, a little experiment teaches the knack of overadjusting so that the end result is the correct setting.

During the test we experienced a loss of power through the formation of varnish and, since this has become a bigger problem with Half-A high performance engines than is generally realized *(Cox discusses this in engine directions – Editor)* a word or two on the subject may be of interest.

First of all, most ordinary domestic varnish is made by blowing heated linseed oil out of a jet, in finely atomized form, so that it mixes with the oxygen in the air. The oil becomes oxidized and turns to varnish. All oils will do this to some degree and modern lubricating oils are treated with an inhibitor to reduce this tendency. Heat unfortunately acts as an accelerator. In a car engine the small amount of oil coming in direct contact with the flame is mostly burned into combustible carbon which is also burned. Consequently varnish on the cylinder walls is no great problem. However, in a model engine we have great gobs of oil passing through a much cooler cylinder and it is not only atomized in the crankcase

(*Continued on page 46*)

CHAMPIONSHIP!

Thimble-Drome ENGINES Holder of more records than any other make!

Produced under exclusive Cox "Temp-Trol" process

COX ADVANCED REAR INDUCTION PRINCIPLE APPLIED TO ROTARY VALVE DESIGN!

RR1

FLUSH MOUNT REAR ROTARY .049

Here's rotary valving at peak efficiency! The SMOOTHEST engine you ever used —plus the advanced fuel induction, operating convenience, and protection of rear valve design. You'll say it's the first successful ½A stunt engine with tank! Positively will NOT run backwards. No outside fuel lines! Mounts in any position. At all dealer's.

$5.95

READY TO RUN NO BREAK-IN REQUIRED INSTANT STARTING!

Ultra Modern!

babe bee

.049

with integral all-metal tank and carburetor unit

A completely NEW engine, with NEW features . . . 13 months in development . . . extremely easy starting . . . right or left hand rotation; all metal tank and carburetor unit; rear top needle valve position; right, left or bottom fuel pick up; no outside fuel lines; easily connected to timer or special tanks; on plane installation no holes necessary in firewall.

$3.95

SENSATIONAL VALUE

Thermal Hopper

More ½A records than all other engines COMBINED

Cox multi-jet carburetor assures top performance and smoothness under varying flight conditions. Even bench mounted, Thermal Hopper attains 18,000 rpm with a 6-inch, 3-pitch prop, 22,000 with a 5-inch prop. Still faster in the air!

$6.95

THERMAL HOPPER MOUNTING

All aluminum. Very light. Quickly converts Thermal Hopper to flush mounting with no holes in firewall. Only 3 screws (no nuts) to install. **75c**

THERMAL HOPPER 2 SPEED CONTROL

Slips on in place of regular (single) needle valve unit. Just unscrew venturi nut and install. A must for ½A radio control.

$1.95

Space Bug

.049

National ½A Champion

Unchallenged in power, performance and easy starting! Simple to operate, work on and care for. For the control-line modeler who wants the very finest in engineering and durability and is willing to pay a little more for it. No break-in required. Designed for upright, inverted, right or left cylinder position. Radial mount.

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GLOW FUEL

Outperforms many so-called "racing" fuels. Heat balanced to withstand high speeds.

pint 95c half pint 50c

RACING FUEL

Jet fast. Hottest fuel at ANY price. **pint $1.10 half pint 60c**

It isn't "as good as a Cox" unless it's made by

L. M. COX Mfg. Co., Inc. SANTA ANA, CALIFORNIA

before passing into the hot cylinder, but also passes through the exhaust ports as vapor or droplets still in its natural state. Consequently, during its passage through the engine, it is being treated in almost exactly the same manner as in a varnish manufacturing process. Therefore, we inevitably have varnish depositing on the cylinder walls and its effect to reduce the running clearance and, owing to its treacle-like tenacity, it has a dragging effect on the piston. As the cylinder volume increases as the square of the surface area, the smaller the displacement of an engine, the greater the relative cylinder wall surface that is presented to the flame and the cooler it is maintained. Therefore, the smaller the engine, the more the varnish and the greater its effect. Having accepted the fact that we need the stuff, here is the best way to deal with it. Wipe it off with a rag dipped in carbolic acid or any carbolic disinfectant, or soak the parts in a solution of one part carbolic to three parts water. Rubbing varnish off the bore with steel wood or abrasives is inadvisable as the majority of engines have soft steel cylinders which are easily damaged. Removal as above is immediate and can be done on the field. When your Half-A loses power in future, do not be alarmed because varnish will be the probable reason. If you do not like dismantling engines, there is no reason why you cannot dunk the whole engine into the solution, provided that the engine is then rinsed with water, oiled and, preferably, run immediately afterward to dry it out and avoid rust.

TEST: Atwood .049 Shriek

Plug: Integral with head; *Fuel:* Supersonic 1000; *Running Time Prior to Test:* 1 hour; *Bore:* .420; *Stroke:* .360; *Weight:* 1.2 oz.

Power Prop	*RPM*
6 x 5	10,850
6 x 4	12,250
6 x 3	14,400
5¼ x 5	12,900
5¼ x 4	14,500
5¼ x 3	17,200
Top Flite	
6 x 5	10,400
6 x 4	11,500
6 x 3	13,050

Atwood Kaysun Plastic as supplied: 16,600.

Ramrod 250 . . .

(*Continued from page* 16)

it was so sensitive to rubber adjustments; 2. a re-check-out was necessary at each flying session, because of very slight warp changes; 3. the glide was fast enough with its high wingloading to cause many broken props and rips in covering.

There disadvantages of the "the hotter the better" theory began to make clear the advantages of the "powered glider" theory. Building a model as large as possible without going far overweight does away with all the disadvantages of the small ship and in addition does one more important thing: it reduces the *sinking speed* of the model so that it can be suspended by a weak thermal, while the smaller one would drop right through.

With this in mind, the "350" Ramrods were put aside and "500's" built. Still the glide was not all it could be, so a "600" was built, over 70 per cent larger than the original model. The "600" has an excellent glide and will thermal at the drop of a hat. In a similar manner, size was found for the Half-A at 250 sq. in. and for the B-C at 750.

Since the Ramrod contains "something borrowed," I think it is only right to recognize those who made contributions. The ideas of both Lew Mahieu and Paul Gilliam had a profound influence on the design of Ramrod. Their help is sincerely appreciated.

Before moving on to the construction of Ramrod, I would like to say a few words about a theory regarding the age-old controversy of spiral stability. It is the direct application of this theory which makes Ramrod one of the most spirally stable free flight models yet designed.

Advocates of both sides of the question produce convincing arguments to back their theories, but both make *assumptions* in their theories—assumptions which may not be true in each case. As an example, one assumes that his model is slipping while in a steep turn, as well may be the case. But *my* model might skid under similar circumstances. Hence, what would act as a stabilizing force in one case might well be a destabilizing force in the other!

I firmly believe that we can safetly throw most of our old spiral theories into the scrap balsa box and substitute what I shall call, for lack of a better phrase, the "top rudder theory." My contention is that to insure a design to be spirally stable we need do only two things: 1. provide in the design sufficient decalage, dihedral and rudder so that we will have, respectively, ample longitudinal, lateral and directional stability; 2. design or adjust our model so that it will climb against rudder. In this way the rudder offset will help hold the tail down in a steep bank. It's as simple as that.

Ramrod is just about as simple to build as a free flight model can be, but a few step-by-step hints may help keep you out of trouble. The first step, of course, is to scale up the plans; for the "250," multiply all dimensions on the drawing by three for full size. If building one of the other Ramrods, use the table for all dimensions

and wood sizes. If a construction detail seems unclear or incomplete, refer to the "250" drawing for clarification.

The Ramrod "250" wing is a little unusual, since it is not built with conventional ribs, as the larger ones are. This "semi-rib" enables one to build as light a wing as possible and greatly reduces the time consumed in cutting out ribs. With an aluminum pattern, ribs can be chopped out in practically no time. The "semi-rib" is not used in the larger Ramrods since more strength is needed and weight is not at such a premium at is it with the Half-A's.

Start your "250" wing by pinning down to the drawing the LE and the notched TE. The 1/16 in. sq. bottom ribs are then added, followed by the two spars and the rib support, which is cemented to the LE. Make sure there is no cement fillet left, which could later hold up the front of the ribs and false ribs. Note that at the center of the wing and at all dihedral joints, full ribs are used, since extra support is required at these places. Finally, cement in place the top ribs and false ribs, except at or adjacent to dihedral joints. These are put in place after the sections have been joined. Shape and sand the completed wing to the section shown and cover it with Japanese tissue. Add the end plates and then spray with water to shrink the tissue. After the water has dried, brush on two thinned coats of dope followed by a hot fuelproofer.

Begin stabilizer by pinning down LE, notched TE and tips. Bottom cap strips are added, followed by the two center ribs and tapered spars. These spars are most easily cut from sheet wood. As in the case of the wing rib support, the stabilizer cap strip separators should be carefully checked for cement fillets immediately after they have been added. At this point the stab should be allowed to dry for at least two hours. Upon returning to work, unpin the LE. Shim it up along its full length 1/32 in. and repin (this figure is 1/16 in. for the "432" and the "600"; 3/32 in. for the "750"), making sure the front spar is well pinned down, except at the stab center. Top cap strips are cemented in place and again the stab is allowed to dry *thoroughly*. Rudder, dorsal fin and the plywood key are added after the stab is covered, but before it is water doped. Again, use only two coats of dope, as with the wing.

Those of you who have built Mahieu's Kiwi will whiz right through your Ramrod fuselage, since the construction is the same. It is built upside down on your workbench—or in the air, if your bench is not flat. Note that a 10° angle has been cut at the front of the fuselage for downthrust. Unless there is something wrong with your model, it will require every bit of the 10°, so build it right into any Ramrod. The pylon position shown is approximate and will vary somewhat with each model. For this reason we recommend that you strap your completed wing and tail to the fuselage, which is complete except for bottom sheeting, pylon and dope; then adjust the wing position until the CG falls within the specified range of 80 to 85 per cent of wing chord back of the LE. Cement pylon in place in such a way that the wing will be directly above the place where balance was obtained. Add bottom sheeting, sand, dope and hot fuelproof. (It is not necessary to cover a fuselage built from sheet wood.) Now your Ramrod is ready for some pre-flight adjustment.

Before you take your new Ramrod out for its initial flight, it is wise to do some pre-adjusting at home. The first step consists of steaming out warps over the old teakettle. The trick here is to estimate accurately the amount of return and compensate for it by overwarping 50 to 100

per cent. Experience has shown that it is best to have the stab flat and the wing warped *slightly* for a left turn. That is, the right sections should be washed-in (positive incidence), the left wing washed-out (negative incidence), or both. If possible, let steamed surfaces set a week or more in your garage or shop before flying. If your estimation of warp return proves poor, try again. After the model has aged, put a few sticks of balsa wood in your back pocket and take the ship to your favorite test-gliding field. Add incidence as required and shim up the left side of the stab so that a medium to wide left-hand circle results.

When you are finally ready to check out your new Ramrod, there should only be one thing left to adjust: the rudder tab. I generally leave the back of the tail unkeyed, and adjust by shifting the whole tail, then keying the back. This eliminates having to crack a rudder tab into your model, but is just a little dangerous, since you can't set a fuse dethermalizer with the stab pinned down. The first test flight should be made with the rudder set slightly to the *left*. Start with the engine running a little rich and the prop on backward. The model should have a shallow bank to the *right* (15-30°). If so, it is safe to turn the prop around and try another flight. Unless you experience difficulty in finding the correct rudder setting, you should have your new Ramrod fully tested in three or four flights! If you have followed instructions carefully, you will note that the angle of bank under high power is almost the same as it is under low power. This is one factor which makes the Ramrod so easy to adjust.

Although the Ramrod uses no sidethrust, it is the 10° of downthrust which facilitates vertical take-offs. The downthrust is very effective at low air speeds and will lean the Ramrod (or any model with a great deal of downthrust) forward into a normal flying attitude soon after it leaves the ground. Thus it is unnecessary to lean this type of model forward *on* the ground for a VTO. Try it sometimes. You will be amazed at the ease with which your model will VTO.

Rescue Craft

(*Continued from page* 24)

Inc.; Messr, J. Rehfield and I. Miller of the Bureau of Ships, U.S. Navy.

Most glow plug or Diesel engines from .099 to .29 cu. in. displacement can be installed in this model. It is advisable to install only a single screw on this craft.

The prototype model is fitted with a Cameron .09 water-cooled engine and therefore is able to operate with the engine hatch closed. Any air-cooled airplane-type engine can be used. However, the engine hatch must be left off to provide cooling air. Engines of more than .19 cu. in. displacement should not be used unless a very large body of water is available, as the very high speed will require a much larger turning radius.

An ED receiver and rudder servo are shown in the plan although any other suitable equipment can be fitted. Do use a positive action proportional rudder servo instead of a sequence type of escapement to actuate the rudder. The high speed of this model necessitates complete and precise control of direction, precluding use of sequence control.

To build, trace the keel pieces K-1, K-2, K-3 and K-4 onto ⅛ in. plywood, cutting them to shape with a coping saw. Note that the keel is actually two complete units which are later cemented together under pressure. To conserve material in the keel, we indicate splices which should be as long as possible. When both keels have been assembled along the splices, mark the location of the propeller shaft tube and the rudder tiller tube on the inner face of each plywood keel. Using an X-Acto or other sharp gouge, channel a groove in each keel for the tubes. Apply plenty of cement to each keel, insert the two tubes into their respective grooves and join the keels under pressure. Set aside to dry thoroughly.

After they have been traced onto the specified material, cut to shape frames and bulkheads from A to J. Cement these to the keel, using plenty of adhesive. Trace and cut out the gunwale pieces G-1, G-2 and G-3, cementing them into the notches in the frames. Now cut to shape the chine pieces C-1, C-2 and C-3 and slip them into the notches in the side of the frames and bulkheads. Cement well and, when they are dry, the framework should be well sanded with 1/0 sandpaper wrapped around a block of wood. Firmly recement all joints.

It is suggested that mahogany veneer of from 1/20 to 1/16 in. thickness be used to cover the side and bottom of the hull. Although ⅛ in. sheet balsa can be used, it is not advisable. The grain should run diagonally, as the plans illustrate. It will be necessary to butt-join several pieces of veneer in order to achieve the correct length. This should be done before the covering is cemented to the hull frame.

Cover the hull in four sections: two bottom and two side sections. These should be cut about ⅛ in. oversize all around. First, apply liberal quantities of slow-drying cement to the keel, chine and bottom of the frames and bulkheads and press one of the bottom covering pieces to the hull. Hold this in place with small straight pins until the cement is dry. Trim away the excess veneer with a sharp single-edged razor blade. Repeat this procedure for the other half of the bottom. Now, apply slow-drying cement to the chine, sides of the frames and bulkheads, and gunwale. Press the side veneer against the side of the hull and hold in place with small pins. Repeat for the other side and trim.

The covering should be recemented strongly from the hull interior to insure firm adhesion to the structure and to insure that it is water-tight.

The engine mount must be very rigidly screwed and cemented to the bulkheads and veneer covering. Several coats of cement should be applied. At this point, the rudder servo platform and battery compartments should be cut from ⅛ in. hard balsa or plywood, if a radio control model is contemplated. Bend the rudder tiller as shown and slip this into the tubing. Cut the rudder to shape and solder it to the lower portion of the tiller. Install the servo at this time, connecting it to the tiller. Connect servo and battery wiring.

If you want a water-cooled engine, the

inlet scoop and outlet should be installed at this time. These were calculated carefully for a full flow of water when the boat is underway and so it is suggested that the dimensions and angles shown be adhered to. First, assemble the scoop and outlet by soldering securely. Now, carefully mark off the openings in the veneer bottom and cut away with a sharp razor blade. Slip the fittings into these holes from the outside of the hull until the brass flange is flush with the hull bottom. Apply plenty of cement, Plastic Balsa or Plastic Wood to the hull interior around the fittings to insure firm attachment. Slip the hose onto the scoop and pass this through the hole in the bulkhead into the engine compartment. A screen can be added to the scoop, if desired.

The main deck is hard ⅛ in. sheet balsa. It is important that the grain run beamwise, as shown on the top view, for greater strength. The well in the transom is optional but the openings for the engine and radio compartments are mandatory. These can be cut out after the deck has been cemented in place.

The 3-in. wide sheet balsa deck pieces are attached singly to the gunwale and bulkheads. Be certain also to cement these pieces to each other. Add the ½ in. high coamings around the openings, as shown. These are cemented to the main deck only. This not only facilitates fitting the cabin and hatch cover but bars from the hull water that may be splashed onto the deck. Sand the hull smooth with 3/0 sandpaper and brush on a liberal coat of Aero Gloss Filler Coat. We made no hatch for access to the servo. It was decided to cut a hatch later, should it prove necessary, but to date none has been required.

While this earlier construction is drying, the cabin and engine compartment cover can be assembled. The former is made entirely from ⅛ in. sheet while the latter is made from ⅛ in. sheet balsa sides and 1/16 in. plywood top. Note the air scoop hood atop the engine hatch. This provides a supply of fresh air to the engine for combustion purposes, so don't forget to cut the hole in the hatch as shown. Apply a layer of Filler Coat to the cabin and hatch. It is an absolute necessity to finish the engine compartment as well as possible with the fuelproof finish like Aero Gloss.

Sand the hull until it is smooth and add the ⅛ x ¼ in. pine spray strip along the chine line. Follow this with the installation of the molding around the sides of the main deck. Add three more applications of Aero Gloss Filler Coat and sand thoroughly with 3/0 sandpaper. Brush on three more coats that are thinned by 15 per cent. Very lightly sand this with 8/0 wet sandpaper—very wet. The finish should now be very smooth and, if not, add more Filler Coat and wet-sand until it is.

Paint the entire hull with Aero Gloss light gray dope. Four or five coats should be sufficient although more can be applied if desired. After the first two coats, sand very lightly with 8/0 wet sandpaper.

Mask off the main deck and color it dark gray. Now mask off the underwater body at the waterline and color that dark red. Three coats of each color should be applied.

The cabin and engine hatch are doped a medium blue and should be filled in the same manner as the hull before being painted.

Carve the deck boxes and vents from balsa blocks and add Balsa Filler Coat. Sand smooth and cement in place the heavy celluloid tops. Notice that the tops overlap the boxes by 1/16 in. all around. These are colored dark gray and then

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☐ THE SPACER: Class AB free flight.
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☐ BEAVER: .19-.35 scale.
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☐ SNIPE: Half-A stunt.
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cemented in place on the deck.

Cut the dowel tripod mast to length and assemble onto the cabin with the ⅛ in. sheet balsa platform atop the assembly. Install the radio aerial at this time, if one is required.

The gun barrels are tapered from dowel while the magazines and mount are carved from balsa block. Color these gray and cement in place. The thread rigging is for exhibition use and should be removable.

The model will ride well in the water if loaded with equipment, as shown. Should no radio be contemplated or should other equipment be installed, the model may require lead ballast either forward or aft in order to ride correctly. Keep the bow up out of the water as shown.

BILL OF MATERIALS
(*All sizes in inches*)

No. Reqd.	Size	Material
4	⅛x3x36	hard balsa
4	⅛x6x12	plywood
6	1/20x6x12	mahogany veneer
1	3/16 dowel x36	birch
1	.015x6x12	celluloid
1	2x2x24	soft balsa
2	⅛x¼x36	hard balsa or pine
1	¾x4x10	hardwood
1	1/16 dia. x12	music wire

Miscellaneous

8 oz. Aero Gloss Balsa Filler Coat; 4 oz. Aero Gloss light gray dope; 4 oz. Aero Gloss dark red dope; 2 oz. Aero Gloss dark gray dope; 2 oz. Aero Gloss Med. blue dope; straight pins; fuelproof cement; 1/0, 3/0, 8/0 wet sandpaper; 1⅛ in. Sterling nylon propeller; .09 to .29 in. engine and flywheel; assorted wood screws and bolts; ⅛ in. dowel; ⅛ in. brass rod; ⅛ in. ID brass tube; straight pins; black decal letters.

Contest Calendar

MAY

6—*Minneapolis, Minn.:* Class AA Spring Meet for FFG, TLG, OR, RC, OHLG, CL, CLS, CLC. Mark Jones, C.D., 5529 Concord, Edina 10, Minn.

6—*Raytown, Mo.:* Class AA Free Flight Gas Meet for FFG. Willard Bivins, Jr., C.D., 10501 E. 59 St., Kansas City 29, Mo.

19 & 20—*Spartanburg, S. C.:* Sky Knights' Record Trials for all free flight and controlline classes. Robert S. Gaddis, C.D., 138 Morgan Square, Spartanburg, S. C.

20—*Fairbanks, Alaska:* Class AA 2nd Annual Midnight Sun Model Airplane Contest for CLS, CLC, CL, CLFS, RC, FFG, PL. Capt. Robert N. Allyn, C.D., 18th Ftr-Intcp. Sqdn., APO 731, Seattle, Wash.

20—*Seattle Wash.:* Class AAA Northwest Regional Model Aviation Meet for OHLG, FFFS, RC, FFG, OR, TLG, CLFS, CLS, NC, CL, CLC, Rat Racing. Earl F. Witt, C.D., Box 134, Lakeview, Wash.

20—*Tulare, Calif.:* Tulare Sky Kings Record Trials for all free flight classes. Don Peacock, C.D., 912 Apricot, Tulare, Calif.

26 & 27—*International Competition Eliminations* for World Championship teams at the following cities: Bakersfield, Calif.; Baltimore, Md.; Bloomington, Ind.; Boston, Mass.; Chicago, Ill.; Cleveland, O.; Columbus, O.; Dallas, Tex.; Detroit, Mich.; Galesburg, Ill.; Los Angeles, Calif.; Miami, Fla.; Minneapolis, Minn.; Nashville, Tenn.; New York, N. Y.; Norfolk, Va.; Omaha, Neb.; Philadelphia, Pa.; Sacramento, Calif. Contact the person nearest you (from the following names) for information: Ed Dolby, 25 Exchange St., Rockland, Mass.; Pete Sotich, 3851 W. 62nd Pl., Chicago, Ill.; Joe Bilgri, 256½ Locust St., San Jose, Calif.

27—*Fresno, Calif.:* Fresno Gas Model Record Trials for FFG. Jim Scheidt, C.D., 2225 Brown, Fresno, Calif.

JUNE

2 & 3—*Santa Ana, Calif.:* Class AAA 3rd Annual California Model Airplane Championships for CL, CLS, CLFS, NC, FFFS, TLG, OR. H. N. Parker, C.D., 1028 W. 87th St., Los Angeles 44, Calif.

3—*Berwick, Pa.:* Class AA Busy Bees' Model Air Meet for FFG, CLS, CLC, Rat Racing. Charles T. Cooper, C.D., 531 Broad St., Nescopeck, Pa.

3—*Goodland, Kan.:* Class AA Northwest Kansas Gashoppers' Model Airplane Meet for RC, FFG. Kenneth Armstrong, C.D., Goodland, Kan.

3—*Osawatomie, Kan.:* Class AA Osawatomie Modeleers Second Annual Model Meet for CL, CLS, CLC. Howard M. Myers, C.D., 131 Pacific, Osawatomie, Kan. Pending.

3—*Cleveland, O.:* Class AA 5th Annual Free Flight Flying Scale Meet. John W. Grega, C.D., 355 Grand Blvd., Bedford, O.

10—*Tulsa, Okla.:* Class AAA 1st Annual Southwest Scale Contest for FFFS, CLFS. Willard H. Kehr, C.D., 4940 N. Johnstown, Tulsa, Okla.

10—*San Diego, Calif.:* Class AA Team Racing Contest. Les McBrayer, C.D., 101-B Elm St., Alhambra, Calif.

10—*Buffalo, N. Y.:* Class A Spring Meet. Pending.

10—*Easton, Pa.:* Class AA Model Airplane Doctors Annual Air Meet for FFG,

OHLG, OR, TLG, RC, CLC, CLC, obstacle course. Russ R. Sottosanti, C.D., 1113 Keane St., Easton, Pa. Pending.

16 & 17—*Spartanburg, S. C.:* Sky Knights' Record Trials for all free flight and controlline classes. Robert S. Gaddis, C.D., 138 Morgan Sq., Spartanburg, S. C.

16 & 17—*Kansas City, Mo.:* Class AAA Kansas City Radio Control Annual Meet for RC. Paul F. Runge, C.D., Box 301, Higginsville, Mo.

16 & 17—*Knoxville, Tenn.:* Class AAA Second Annual Tennessee Exchange State Model Meet for FFG, OR, TLG, CL, CLS, CLFS. Hugh D. Powers, C.D., 166 Marshall Rd., Maryville, Tenn.

17—*Moses Lake, Wash.:* Pending.

17—*St. Clair Shores, Mich.:* Class AA Emerald Harbor City Air Fair for CL, CLS, CLC, CLFS. Howard A. Lewis, C.D., 21520 California, St. Clair Shores, Mich.

17—*Long Island, N. Y.:* Class AAA Gas Monkeys' 9th Annual Long Island Championships for FFG, Jetex, OHLG, OR. Edwin W. Howe, C.D., 5 Camdike St., Valley Stream, N. Y.

17—*Wichita, Kan.:* Class AA Y" Wichihawks' 4th Annual Controlline Meet for CL, CLS, TR, CLC. Jean P. Valle, C.D., 3208 S. Vine, Wichita 13, Kan.

17—*DeKalb, Ill.:* Class AA DeKalb Cloud Dusters' Radio Control Meet. Dutch Hess and Dale Hindenburg, C.D.'s, 137½ E. Lincoln, DeKalb, Ill.

17—*Richmond, Ind.:* Richmond Aviation Club Meet. For info: William J. Cox, 219 So. 32nd St., Richmond, Ind. Pending.

17—*Tulare, Calif.:* Tulare Sky Kings Record Trials for all free flight classes. Don Peacock, C.D., 912 Apricot, Tulare, Calif.

17—*Farmingdale, N. Y.:* Class AA 3rd Annual Long Island Industrial Championships for CL, CLS, beauty, CLC, NC. Arthur F. Wardell, C.D., 2 Hunt Place, Bethpage, N. Y. Pending.

23 & 24—*Daytona Beach, Fla.:* Class AA Daytona Spring Model Airplane Meet for FFG, OHLG, TLG, RC, CLS, Rat Racing, CLFS. William T. Thomas, C.D., 105 N. Halifax Ave., Daytona Beach, Fla.

24—*Hamilton, O.:* Class AA Hamilton Aero Club Meet for FFG, OHLG, OR. Walter L. Weber, C.D., 435 Dick Ave., Hamilton, O.

24—*Detroit, Mich.:* Class AAA Annual Michigan State Exchange Clubs' Model Airplane Meet for FFG, CL, OR, TLG, CLS, CLC, TR, PL, RC. Entry restricted to residents of Michigan. Frank P. Sposite, C.D., 8904 Woodward Ave., Detroit 12, Mich.

24—*Hagerstown, Md.:* Contest for FFG, CL, RC. John Young, C.D., Box 691, Hagerstown, Md. Pending.

24—*Houston, Tex.:* Class AAA Houston International Model Airplane Contest for FFG, CL, CLS, CLC, RC, TLG, OHLG, OR. Paul I. Brown, C.D., 3023 Durwood, Houston 16, Tex.

24—*Meriden, Conn.:* Class AAA Connecticut State Controlline Championships for CLFS, CLS, CLC. Chester A. Orrill, Jr., C.D., 47 Carpenter Ave., Meriden, Conn.

24—*White Plains, N. Y.:* Class AA Exchange Club's 2nd Annual Model Aviation Meet for FFG, RC, CLC, CLS, OR, OHLG. A. E. Lehmberg, C.D., North Salem Rd., Ridgefield, Conn. Pending.

24—*Taft, Calif.:* Taft Model Airplane Club Record Trials for FFG. H. E. Owen,

C.D., 417½ Van Buren St., Taft, Calif.

24—*Fresno, Calif.:* Fresno Gas Model Record Trials for FFG. Jim Scheidt, C.D., 2225 Brown, Fresno, Calif.

24—*St. Paul, Minn.:* Class AAA Minnesota U-Control Championships for CLS, CLC, CLFS, CL, TR. Keith V. Lightfoot, C.D., 3634 White Bear Ave., White Bear Lake 10, Minn.

Radio Control News

(*Continued from page* 30)

plan. The entire club would meet about two to four times a year at a central spot.

One thing we have noticed, which this club seems to realize, is that you must have a planned program in order to maintain interest in the club itself. Have speakers in from time to time, show RC movies and discuss or plan new projects. Movies can be obtained through the AMA. Projects could include new equipment design, packaging of receivers or unusual plane projects needed for duration, altitude or speed events, or perhaps an airborne camera ship or one which would transmit Geiger counter results back to the ground. More clubs should exchange information as to what they find a successful formula for the operation of a good RC club.

Jim Thrift sends in news of an active RC/NC group from down Winston-Salem, N. C. way. More than 40 planes were out at a meet on January 22 – down South, that is. After a good meal of Southern fried chicken and strawberry shortcake, it was decided that **all transmitters must be registered with the FCC.** At least here is one club that is putting some teeth into the regulations. Flying scale RC jobs held their own and Jack Lynch, using 465 mc, flew at will. This is another example of getting away from the crowded 27 mc band. With two makes of 465 mc equipment, this should be an excellent way to run off future contests in a minimum of time. The next big contest down that way is the Annual Invitational Meet, scheduled for June 1-3 at Lynchburg, Va.

Frank B. Baker, 1414 3½ St., S.E., Rochester, Minn., reports that even though the trend is away from the big RC jobs, one of the local boys is building an 8 ft. Jenny. Frank has a 37 in. Fokker D-7 with an Arden .099 which we hope does a little better than one we built about six years ago. Strictly a scale job, ours had too much rudder area and insufficient power (.075). The Miller hard-tube receiver is giving good performance up that way even though one unit has survived three rebuilding jobs.

Perhaps our campaign regarding FCC registrations and writing to your Congressman is paying off. The Springfield Strato-Hawks of Springfield, O., have already written to their Congressman stating the basic facts, namely: prove to the FCC the actual interest in RC work (this means sending in *all* registrations), requesting the use of the band of 26.96 to 27.28 mc or the frequencies between 13.533 to 13.566 mc and 40.00 to 40.66 mc. They have also outlined the problem of having high-powered transmitters affecting the sensitive RC receivers as used in planes or boats. Gerald L. Wiles is the secretary of the Strato-Hawks and it may pay to write him for further information on such activity. Address him at 220 E. James St., Bradford, O.

Photo of the four-channel reed receiver is from Geoffrey Pike, Nottingham, England. Using three DL-66 tubes, the filament drain is 45 ma and the unit was ground-checked at a distance of 3½ miles. The receiver was in a building surrounded by steel work and no pulses were missed. Geoffrey built the reed unit himself, which is somewhat of a miniaturized ED version. Needless to say, this type of receiver will work quite well if properly designed and tuned. Geoff mentioned that the transmitter input was but two watts. Last June, we mentioned that he used a "fail-safe" system whereby the plane spiraled in if it did not receive a signal within, roughly, a one-minute period. We thought that was a pretty drastic way to prevent a fly-away and recently have been informed that the device actually reduces the throttle on the engine. Also, the December '55 article on Geoff's ignition system used a two-arm escapement instead of the four-arm as mentioned.

Norman Jameson, 135 E. Cliveden St., Philadelphia, Pa., announces an RC get-together and flying session on May 5-6. This event will be held at the Welden Fire House, Glenside, Pa., with flying at Vern Kroamer's Field, Route 563, a few miles west of Route 309, near Sellersville, Pa. Radio theory will be discussed and they also plan to show color movies of the 1955 Nats and other RC events.

Leon Kresl, 705 S. 37th St., Omaha, Neb., sends in the announcement of the RC contest scheduled by the Omahawks Radio Control Club to be held August 18-19. Meet will be held at Benson Park in Omaha and will consist of rudder-only and multi-channel events. This announcement came in well in advance of the meet and we are quite sure it will give everyone in that area a chance to consider it. It is preferred that all contests, meets or get-togethers be announced three months in advance so we'll have plenty of time to get the information in print.

NEW ITEMS

The big item of interest this month is

the announcement by Babcock Radio Engineering, Inc., 7942 Woodley Ave., Van Nuys, Calif. of their line of 465 mc equipment. The main feature of this equipment is that the receivers are completely transistorized and that two channels (5 kc and 7 kc) can be received or transmitted simultaneously. Although we have not yet obtained a unit, we understand the receiver uses a diode detector for the RF and the AF is taken care of by the transistors. The single-channel receivers measure 1⅜ x 2⅝ x 3⅜ in. and weigh but 8 oz. each, including the single B battery. The dual channel receiver, capable of receiving both 5 kc and 7 kc modulated signals, measures only slightly larger and weighs 10 oz. with battery. We consider the Babcock designs for 465 mc operation to be one of the deciding factors in the greater use of this frequency. At the same time, this equipment is the first to make multi-plane flying a distinct possibility. This last item is a pet sideline with us and we've mentioned it to several clubs and organizations which agree that there are terrific possibilities. Now we can have team races and combat events. Price of the single-channel receiver is $39.95; the dual channel receiver is $69.95 and the transmitter (two channels) is $69.95. Prices include installation materials.

Last month we told of a new "gadget" which we think will have many applications. It is the single-channel reed unit made by CG Electronics Corp. of Albuquerque, N.M. The bare reed relay is about the size of a Gem relay and weighs less than ⅛ oz. Reed frequencies may be had in a range of from 200 to 600 cycles and the band width is almost double that of the average reed relay. We'd like to tell more about this unit but would not be able to do justice to the fine sheet describing this unit and others, to say nothing of the helpful hints and curves on these reed relays. The technical information alone is worth your investigation.

You may ask, just what is the value of a single reed? A single reed will give a simple method of selective audio reception. Other RC applications which you might be interested in, such as garage door openers, could be successfully operated with such a unit. The price on this sub-miniature reed relay is $5.95. CG is also offering a five-channel reed relay of different design, weighing but ¾ oz. for $19.95. If you are interested in building your own five-channel reed receiver, you may purchase the parts package for $32.95. This is complete with all parts, less the reed relays and secondary relays. Being a transistorized unit, the complete weight, with batteries, is but 9 oz. This unit measures a small 2 x 3 x 2¼ in. In case you need a good five-channel transmitter, CG is now offering their model T-5 for $79.95. Some of the features are: audio frequency stability within 2 cps over the useful range of the batteries, pre-tuned RF section, stick type control and a lamp which indicates when the unit is on. The lamp also indicates the condition of the B batteries.

The Wilshire Model Center, 1326 Wilshire Blvd., Santa Monica, Calif., has a new German receiver, the MK-2, which sells for $24.95. Some of the novel points of this unit are the use of a "tuning eye," stable operation, reliable operation with as low as 30 volts' B supply and up to an 8 to 10 mil current change if you use 60 volts. The 30 volts on the B supply will give a current change of 4 to 5 mils. We are checking out our unit and will give more details in a later issue. All in all, German radio control equipment is very well made and, as you can see, has many unusual features. More and more German

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equipment and RC news will be coming over soon and we think you'll learn a lot from it.

TECHNICAL TOPICS

Many readers have inquired about the drone target receivers which are available from various "surplus" sources and about which we wrote in the April, 1954 issue of MAN. The data given at that time concerned the Army type RC-57-A receiver. C & H Sales Co. of Pasadena, Calif. is selling the Navy version, R-116/ARW-26. Being in possession of both types of unit, we can say they are practically the same in construction and selection of components. The Navy unit is waterproofed and in a slightly different case. Tube line-up and functions are the same, the main difference being in the power plug. These receivers employed an RF amplifier followed by a detector, before feeding the AF to the AF amplifiers. This entire tuning unit, using 6V tubes, may be replaced by a simple filament-type detector tube, such as a 1U5. The voltages generally used for checking the receiver may be found in the chart of Fig. 1 near the end of this article. A transmitter using at least 60 per cent modulation, with the audio tone being within plus or minus three per cent of any of the normal frequencies, is required. Last month we mentioned the work done by Frank Schwartz of Nashville, Tenn., in miniaturizing this type of equipment. If the response is great enough from interested readers, we'll print data on this conversion.

Several readers have wondered about the schematic of the CG transistorized reed receiver which we gave sometime ago. The main point of inquiry is the seeming lack of B-plus voltage on the plate of the 1AG4. The B-plus for the 1AG4 is fed through the detector coupling transformer. The point marked "ground" is actually the B-plus connection from the battery and all other voltage points are isolated to avoid a short. Our unit is still ticking away after almost a year of use.

Have you been looking for something different in RC? Something that has *never* been published before and which is still a useful item? Then read what Ralph Brunson and John Schweitzer of Washington State have done in the way of bringing something new into the RC field. A photo shows a compact transistorized power supply for receiver work. Known as the Transistor Power Converter, this unit, as shown, measures but ¾ x 1¼ x 2⅜ in. and weighs only ¾ oz. A printed wiring version is only 2⅜ in. in length. The schematic is for this unit and no trouble should be encountered in building it, provided a few simple precautions are taken. Even though the winding data is given for the transformer, the best precaution against malfunctioning is to buy the transformer, completely wound and with color coded leads, from B & S Products Co. Box 135, Mercer Island, Wash. This unit sells for $3. The company will mount it on a printed wiring chassis, with all leads correctly phased, for $5. Incidentally, the transistors for this unit, as shown, cost $1.25 at most radio supply houses.

Figure 1

	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
RF Amp (9003)	0	0	7.2	0	128	128	0
Det (9002)	0	0	0	7.2	128	0	0
1st Amp	0	56	0	25	1.4	56	0
2nd Amp	0	55	0	55	1.4	55	0
300 cps tube	0	125	X	128	0	125	1.4
650 cps tube	0	125	X	128	0	125	1.4
955 cps tube	0	125	X	128	0	125	1.4
1390 cps tube	0	125	X	128	0	125	1.4
3000 cps tube	0	125	X	128	0	125	1.4

X-Measure: 67½ volts at Pin 4 on Jones plug (bias)
Tube voltages: positive to ground.

Now for some data on the Transistor Power Converter, which has been given a thorough field-check in both planes and boats for about six months. The actual size of the converter is no more than that of a 22½V hearing aid battery and the weight is less. From it, you can obtain 22½ and 45 volts and the power to drive it is obtained from three pencells, connected in series to give 4½ volts. *Do not* attempt to apply more than 4½ volts to this circuit to obtain a higher voltage output. We think you'll all agree that, after the initial cost of building this converter, the cost of three pencells is considerably less than replacing hearing aid batteries.

What kind of regulation is obtained? This will depend upon the load. With no load connected to the 45 volt tap, the input drain is about 20 ma. With a current drain of 2 ma on the output, the output

voltage drops to about 42 volts and the input current from the 4½-volt source will increase to about 40 ma. With the maximum drain of 4 ma on the output, the output voltage will drop to about 40 volts and the input current will increase to around 60 ma. The over-all efficiency averages about 55 per cent. We have found that this unit is more ideally suited to transistorized circuitry because of the separate 22½ and 45-volt windings. For those readers who may question the filtering action, there may be a slight amount of 120 cycle ripple present at the output. However, it amounts to but 1½ to 2 per cent and has caused no trouble on various tone receivers. Our unit has been used on the CG transistorized reed receiver with excellent results. Our unit has also shown better voltage regulation than stated above. The voltage regulation is governed by the characteristics used. As long as one of the transistors has a high "beta" (gain factor), the regulation will be pretty good. The transistors used must have a cut-off frequency of about 1 mc and, since the CK-722 falls well below this figure, the CK-722 is not suited for this application.

Should you decide to build a "super" unit, you could use 2N34 transistors. These cost more than the 2N107's but will provide better over-all efficiency and regulation. Incidentally, this converter operates at about 5 kc so don't think anything is wrong if you happen to hear this note. A high oscillation frequency like this allows smaller filter capacitors to be used. While we're on the subject of filter capacitors, electrolytic capacitors, while providing better filtering action, have too high a leakage current and also hinder the starting action. A good quality paper capacitor is recommended. For those of you who have access to a transistor checker, do not be misled by attempting to select two closely matched transistors. A high gain is desirable; however, a certain amount of mis-match is required in order that the oscillator function with a load applied.

The phasing resistor R, as shown, is used as follows: leave secondary disconnected from the diodes and do not connect in the 1K resistor; tie center tap of feedback winding (4t No. 36 wire) to 4.5 volts plus, through the 47 ohm resistor as shown; place a 0-15 or 0-25 ma meter in series with the battery and observe current; if *no* current is read on the meter, reverse feedback windings; if it still does not draw current after having reversed the feedback winding, switch transistors (this is seldom necessary); the circuit should draw about 10 ma with the secondary disconnected, if the phasing is correct. *Do not* connect secondary and load until this has been checked out. With the correct phasing ascertained, remove the 47 ohm resistor and connect in the 1K as shown. Connect secondary winding to diode bridge circuit.

If the unit does not start oscillating, as evidenced by the proper voltage output of about 40 to 44 volts, with a load applied, the transistors must be changed. Reduce the load or remove the load completely. If the load must be removed completely, this may be done by means of an extra switch, which can be turned off and then back on after the unit begins to oscillate.

As was mentioned before, this Transistor Power Converter by R. Brunson and J. Schweitzer has been thoroughly tested for use with carrier-type receivers and on various reed receivers and the Badaco tone actuated receiver. The B & S Products Co., Box 135, Mercer Island, Wash., can furnish wound transformers, etched wiring chassis and any other parts needed.

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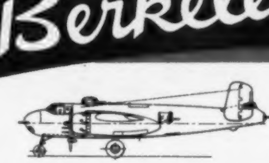

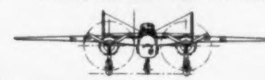

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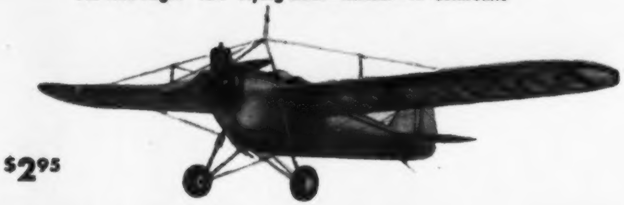

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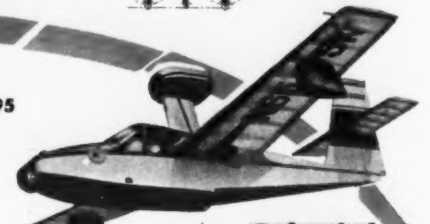

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